Habitat Conservation Plan

(Public Review Draft)

Simpson Timber Company
Northwest Operations
Shelton, Washington

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1 INTRODUCTION

1.1 GENERAL

Simpson Timber Company ("Simpson") owns and manages approximately 287,000 acres of commercial timberland in Washington (Figure 1). To date, its forest management practices have not been seriously constrained by restrictions imposed under the Endangered Species Act (as amended, the "ESA"). However, in the face of an increasing number of petitions filed under the ESA to classify various species of fish as "threatened" or "endangered", Simpson has elected to engage the National Marine Fisheries Service ("NMFS") and the U.S. Fish and Wildlife Service ("USFWS") in conservation planning efforts on approximately 91 percent of its Washington timberland holdings.

The following plan has been prepared with the assistance of NMFS and USFWS, among others (see Appendix I), and is intended to satisfy the requirements of Section 10 of the ESA. Based upon the commitments reflected in this plan, Simpson expects to receive an incidental take permit ("ITP") for all fish, amphibian, and wildlife species designated in Tables 1 and 2. Such a permit should allow Simpson to avoid the uncertainty inherent in the current regulatory climate and should afford Simpson with a continued opportunity to harvest timber resources from its lands. An even flow of timber resources is essential to the viability of Simpson's manufacturing facilities and the economic health of the surrounding communities located in the vicinity of Shelton, Washington.

1.2 CORPORATE PHILOSOPHY

Simpson is a privately held company with a long tradition of responsible resource stewardship and citizenship. The foundation of Simpson's success is the management of its fee-owned timberlands and related businesses spread across Washington, Oregon and California. While these lands are private, Simpson understands that events, natural or otherwise, that occur on its property can have impacts that extend beyond the boundaries of its ownership. Through the application of research and sound science, Simpson is committed to understanding these impacts and, where practical, mitigating any significant consequences resulting from its management activities.

As a forest products company, Simpson's business is of a long-term nature. Given that this is the character of the business, a stable operating and regulatory environment is critical. While Simpson's Washington operations are not now seriously constrained by the limitations of the ESA, Simpson views this Habitat Conservation Plan ("HCP" or "Plan") as a vehicle for accelerating the arrival of regulatory stability.

The process of developing this plan encompassed business, legal, scientific, regulatory, political and ideological issues and tradeoffs. There were no quick or simple solutions to the many difficult issues addressed in this plan. The process of developing the particular prescriptions identified below was a time-consuming and highly iterative process involving countless internal corporate discussions as well as substantial input from state and federal agencies, local Indian Tribes, environmental groups and other interested parties. Simpson believes that the resulting plan, while costly to develop and costly to implement, is the best possible approach for dealing with the complex web of issues surrounding the management of its property in a manner that leads to constructive results for the company, its community and the environment.

Figure 1. Vicinity map of the HCP area.

Note: this figure is available for viewing as a separate file.

Simpson believes that implementation of the plan should yield the following benefits:

- The resource base, from a scientific perspective, is placed on an improving trend line as a result of Simpson's conservation practices.
- Simpson's activities will yield a net benefit to a wide range of listed and sensitive fish and other wildlife species.
- With greater certainty, Simpson will be able to operate in an economically rewarding manner.
- Simpson will be able to continue to harvest its timber on a long-term sustainable basis, which will yield positive results for the company and for the communities dependent upon Simpson for jobs and economic health.
- All of Simpson's actions will be consistent with Simpson's overall commitment to responsible stewardship.

1.3 GOAL OF PLAN

The following HCP has been designed to: (1) minimize and mitigate any incidental take of the covered species described herein which may occur as a result of Simpson's forest land management, and (2) to ensure that any such taking will not appreciably reduce the likelihood of the survival and recovery of such species in the wild. Implementation of the complementary suite of conservation measures described below will meet and actually exceed these requirements, by contributing to the maintenance and development of intact, ecologically connected, and naturally functioning aquatic and riparian ecosystems.

1.4 SPECIES ADDRESSED IN THE PLAN

Upon signing, the HCP and the ITP provide immediate ESA coverage for a discrete list of fish, amphibians, and wildlife. These species are listed in Table 1 and Table 2.

1.4.1 Aquatic Dependent Species

Thirty aquatic species have been specifically identified for ESA coverage and conservation under provisions of this HCP. The aquatic species list is composed of species that are either entirely dependent on aquatic habitat or closely associated with the margins of channels and riparian habitats for all or a portion of their life. This list is not all-inclusive for aquatic species within the Plan Area and there were various reasons for including or excluding particular species from the list. For about one half of the species, there is an expectation that they may, if they have not already, come under ESA conservation status. These species include all of the salmonids, the stream breeding amphibians, the Van Dyke’s salamander, two species of lamprey and the western toad. Several other species are on the list due to anomalous regional or Plan Area distributions or because there has been conservation concern voiced by state agencies or Indian Tribes. Species in this category include the Olympic mudminnow, threespine stickleback, longnose dace and the reticulate, riffle and shorthead sculpin. The other species on the list are generally cosmopolitan in their distribution and are included because their coverage demonstrates expected conservation results that may apply to other species for which no explicit analysis is provided.

The Plan Area encompasses multiple evolutionarily significant units ("ESU") for all salmonid species; thus a single species may enjoy multiple ESA conservation status. For example the status of Puget Sound/Strait of Georgia chum does not warrant their listing, whereas the Hood Canal summer run chum are listed as threatened. Likewise, Puget Sound chinook are listed as threatened, but the NMFS Status Review for chinook concluded that the Washington Coastal ESU did not warrant listing. Status reviews are complete for all salmonid species within the Plan Area except Dolly varden. Status reviews for steelhead, coho, and pink salmon resulted in candidate status for coho in the Plan Area but no special status for steelhead or pink salmon. In total, 13 of the 30 species listed in Table 1 have been recognized for special conservation status by state or federal agencies in the Pacific Northwest.

1.4.2 Wildlife Species

Simpson's management prescriptions also will directly benefit 21 wildlife species (identified in Table 2) that are not included in the aquatic species associations of Table 1. Species that rely on snags to meet a majority of their nesting requirements are grouped together separately in Table 2, according to three snag size class requirements. These classes are defined as: Class 1: 8.0-14.0 inches DBH; Class 2: 14.1-20.0 inches DBH; and Class 3: >20 inches DBH.

Federally listed endangered species do not inhabit the Plan Area; however, three wildlife species listed as threatened by the USFWS potentially exist in the HCP area: the marbled murrelet, the bald eagle and the northern spotted owl (*Strix occidentalis*). Simpson is requesting an ESA Section 10 Incidental Take Permit for the marbled murrelet and bald eagle. No incidental take of the Northern Spotted Owl is requested as part of this HCP.

Conservation measures have not been specifically included in this HCP to protect northern spotted owl habitat and no incidental take of the northern spotted owl is requested as part of this HCP. However, Simpson will protect the spotted owl by following state and federal regulations. Current state regulations require landowners to protect the best 70 acres of nesting and foraging habitat centered around northern spotted owl nest sites during the nesting season. Timber harvest, yarding and road building are not allowed within these areas unless surveys show that spotted owls no longer are nesting in these sites.

Table 1. Aquatic and riparian dependent species addressed by the Simpson HCP.

Species	Federal[1] Status	State Status
Headwater Species Association		
Torrent salamander (*Rhyacotriton olympicus*)	FSC	SM
Tailed frog (*Ascaphus truei*)	FSC	SM
Cope's giant salamander (*Dicamptodon copei*)		SM
Western redback salamander (*Plethodon vehiculum*)		
Steep Tributary Species Association		
Cutthroat trout (*Oncorhynchus clarki clarki*)	FPT	
Shorthead sculpin (*Cottus confusus*)		
Van Dyke's salamander (*Plethodon vandykei*)	FSC	SC
Flat Tributary Species Association		
Coho salmon (*Oncorhynchus kisutch*)	FC	
Chum salmon (*Oncorhynchus keta*)	FT	
Riffle sculpin (*Cottus gulosus*)		
Coast Range sculpin (*Cottus aleuticus*)		
Reticulate sculpin (*Cottus perplexus*)		
Speckled dace (*Rhinichthys osculus*)		
Brook lamprey (*Lampetra richardsoni*)		
Mainstem Species Association		
Chinook salmon (*Oncorhynchus tshawytscha*)	FT	
Steelhead trout (*Oncorhynchus mykiss*)		
Pink salmon (*Oncorhynchus gorbuscha*)		
Bull trout (*Salvelinus confluentus*)	FPT	
Dolly varden (*Salvelinus malma*)		
Torrent sculpin (*Cottus rotheus*)		
Longnose dace (*Rhinichthys cataractae*)		
Pacific lamprey (*Lampetra tridentatus*)	FSC	
River lamprey (*Lampetra ayresi*)	FSC	
Western toad (*Bufo boreas*)	FSC	
Lentic Species Association		
Prickly sculpin (*Cottus asper*)		
Olympic mudminnow (*Novumbra hubbsi*)		SC
Threespine stickleback (*Gasterosteus aculeatus*)		
Northwestern salamander (*Ambystoma gracile*)		
Long-toed salamander (*Ambystoma macrodactylum)*		
Red-legged frog (*Rana aurora*)		

Federal Status Codes:
FE - Federally Endangered
FT- Federally Threatened
FC - Federal Candidate
FSC - Federal Species of Concern
FPT – Federal Proposed Threatened

State Status Codes:
SE - State Endangered
ST - State Threatened
SC - State Candidate
SS - State Sensitive
SG - State Game Species of Concern
SM - State Monitor

[1] Indicated for ESUs within the Plan Area only.

Table 2. Wildlife species addressed by the Simpson HCP.

Species	Federal Status	State Status
Marbled murrelet (*Brachyramphus marmoratus*)	FT	ST
Bald eagle (*Haliaetus leucocephalus*)	FT	ST
Harlequin duck (*Histrionicus histrionicus*)	FSC	SG
Band-tailed pigeon (*Columba fasciata*)		SG
Roosevelt elk (*Cervus elaphus Roosevelti*)		SG
Class 1 Snag Dependent Species		
Downy woodpecker *(Picoides pubescens)*		
Black-capped chickadee *(Parus atripcapillus)*		
Class 2 Snag Dependent Species		
Western bluebird (*Sialia mexicana*)		SM
Purple martin (*Progne subis*)		SC
Chestnut-backed chickadee *(Parus rufescans)*		
Red-breasted sapsucker (*Sphyrapicus ruber*)		
Tree swallow (*Tachycineta bicolor*)		
Violet-green swallow (*Tachycineta thalassina*)		
Hairy woodpecker (*Picoides villosus*)		
Western screech owl (*Otus kennicottii*)		
Northern pigmy owl (*Glaucidium gnoma*)		
Northern saw-whet owl (*Aegolius acadicus*)		
Northern flicker (*Colaptes auratus*)		
Class 3 Snag Dependent Species		
Pileated woodpecker (*Dryocopus pileatus*)		SC
Wood duck (*Aix sponsa*)		SG
Common merganser (*Mergus merganser*)		SG

Note: Snag dependent species are grouped according to similar snag requirements – Class 1: 8.0-14.0 inches DBH; Class 2 14.1-20.0 inches DBH; Class 3: >20.0 inches DBH.

Federal Status Codes:
FE - Federally Endangered
FT- Federally Threatened
FC - Federal Candidate
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State Status Codes:
SE - State Endangered
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SC - State Candidate
SS - State Sensitive
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SM - State Monitor

1.5 ACTIVITIES

Activities to be covered by the HCP and the ITP include most aspects of Simpson's forest practices and related land management. This HCP and the ITP are also intended to cover certain monitoring activities and the conduct of related scientific experiments in the Plan Area.

Activities covered by this plan include all aspects of mechanized timber harvest, log transportation, road construction, maintenance and decommissioning, site preparation and slash abatement, tree planting, fertilization, silvicultural thinning, experimental silviculture, wildfire suppression, stream restoration, research and monitoring pursuant to Section 9 of the HCP, management and harvest of minor forest products and vertebrate control. During the plan period Simpson will apply pesticides in the HCP area as needed to control vegetation and organisms that may suppress or inhibit tree growth. All pesticides will be applied in accordance with applicable regulations of the Environmental Protection Agency ("EPA") and applicable laws of the state of Washington. The application of pesticides is not a covered activity under the ITP because the USFWS does not grant Incidental Take Permits for pesticide applications; those activities are covered by incidental take statements issued in connection with Section 7 consultations between the USFWS and the EPA.

Covered activities include the following:

Mechanized Timber Harvest: Management of lands for commercial timber production. Simpson intends to manage its lands, outside of conservation areas, primarily using clearcut harvest methods with an average rotation age of 40-50 years. Specific activities included within this description include: stream typing and classification (using electro-fishing equipment), unit layout, felling of timber, bucking of timber and yarding of timber with ground, tower, or aerial logging systems.

Log Transportation: Transportation of logs to mills in Shelton vicinity via road and railroad.

Road Construction, Maintenance, and Decommissioning: Construction, maintenance and decommissioning of roads. Simpson will construct roads as needed for its commercial timber production and associated land management. Roads will be constructed and maintained according to standards described in this HCP. Examples of specific activities include the surfacing of roads, the clearing and maintenance culverts, the decommissioning of certain roads and the closing of certain roads to motor vehicle access.

Site Preparation and Slash Abatement: Scarification and burning of slash in accordance with applicable laws for the state of Washington in management units harvested by clear cutting.

Tree Planting: Planting of trees. Simpson will typically plant 250-400 trees per acre within 18 months following harvest.

Fertilization: Fertilization of trees to accelerate growth. Typically, Simpson will fertilize certain timber stands within the plan area up to two times between ages 15 and 40 with the application of approximately 440 pounds of nitrogenous pelletized fertilizer per acre.

Silvicultural Thinning: Thinning in some or all of the timber stands in the plan area prior to clearcut harvest, including, commercial thinning and pre-commercial thinning in stands younger than 30 years old.

Experimental Silviculture: Conducting experimental silvicultural practices such as implementing alternative forest management methods for some units, practicing uneven-aged management, engaging in partial cutting and seed tree management, feathering mature leave trees along outer edges of riparian forest buffers; manipulating various stands to speed conversion of hardwood riparian stands to conifer and creating snags via blasting or cutting methods.

Wildfire Suppression: Prevention and suppression of wildfires consistent with Washington State Department of Natural Resources fire suppression plans.

Stream Restoration: Establishment of a limited number of pilot projects to pursue alternative approaches to stream restoration.

Research and Monitoring: Conduct of research and monitoring pursuant to Section 9 of this HCP.

Minor Forest Products Management and Harvest: Permitting the harvest of minor forest products from the plan area. Such products could include, among others: firewood, salal, ferns and mushrooms. The following defines the scope of current and potential future minor forest products permits.

Type of Minor Forest Product	Acres of Area Permitted in 1997	Estimated Potential Range of Acres Permitted Each Year of the HCP Period
Firewood	4,200 acres	4,000 to 5,000 acres per year
Salal	61,000 acres (all three products were covered under one permit)	50,000 to 60,000 acres per year
Mushrooms	3,000 acres per year	2,000 to 7,000 acres
Ferns	400 acres	Unknown

Vertebrate Control: Engaging in vertebrate control as necessary to control damage to plantation seedlings. Currently such control is limited to mountain beavers and no other vertebrate control is currently anticipated.

1.6 TERM OF THE HCP

This HCP has a 50-year term expiring on the 50th anniversary of the date on which the first ITP is issued hereunder. All species in Table 1 and Table 2 are covered for the term of the plan. The IA describes certain circumstances under which the HCP may be terminated earlier, as well as provisions permitting Simpson to extend the term of the HCP for an additional fifty years.

2 CHARACTERISTICS OF THE PLAN AREA

2.1 HCP AREA

Simpson proposes to manage approximately 261,575 acres of its Washington properties pursuant to this HCP. The Plan Area extends into the southern foothills of the Olympic mountains and across the Wynoochee River valley to the City of Aberdeen's Wishkah watershed. Adjacent lands are owned to the north by the U.S. Forest Service ("USFS"), to the west by the City of Aberdeen and Weyerhaeuser, to the south by Weyerhaeuser, Port Blakely Tree Farms, L.P., other smaller private owners, and the Washington State Department of Natural Resources ("DNR"), and to the east by numerous small land owners (Figure 2).

During the HCP period Simpson may make simple fee purchases of lands within the area encompassed by the HCP boundary (Figure 1)[2]. Simpson may add lands to the HCP via the HCP minor amendment process, described in the IA. All conditions of this plan also would apply to the new lands added to the HCP by Simpson. Simpson's management on these lands also would receive ITP coverage, in accordance with the provisions of the HCP and associated Implementation Agreement.

2.2 LANDSCAPE STRATIFICATION

At a fundamental level, ecosystem structure and dynamics are influenced by geologic settings, climatic factors and their interaction. Any site specific, science-based approach to landscape management must account for these essential influences because they are largely responsible for much of the natural variation in habitat types at various spatial and temporal scales. This variation in habitat type directly controls the distribution of species and biological communities and has a strong linkage to their response to disturbances. At least as important, from a land use perspective, is the way in which these fundamental influences shape the sensitivity of a landscape to land use type and intensity.

The influences of the geologic setting and associated physical processes on the HCP area aquatic habitats have been captured by stratifying the landscape into "lithotopo units" ("LTU") (areas of similar lithology and topography) after the general concept of Montgomery (1997). A second level of stratification consists of classifying stream segments of the channel network within each LTU. Since the Plan Area is highly variable with respect to rock type and geologic history, the LTU stratification seems especially well suited for this landscape.

[2] In the future, the Plan Area may be changed by the addition or deletion of properties as further described in Section 12 of this HCP and as specified in the Implementation Agreement ("IA").

Figure 2. Ownership map of the HCP area and adjoining lands

Note: this figure is available for viewing as a separate file.

2.2.1 Lithotopo Units

The Plan Area has been divided into five LTUs: (1) Alpine Glacial ("AGL"), (2) Crescent Islands ("CIS"), (3) Crescent Uplands ("CUP"), (4) Recessional Outwash Plain ("ROP"), and (5) Sedimentary Inner Gorges ("SIG") (Figure 3). Geology, geological history, and topographic relief determined lithotopo unit boundaries. The delineation of these areas represents a finer scale stratification of the regional landscape than has previously been proposed (see for example Omernik 1987), and divides the Simpson properties into areas that share similar erosional and channel forming processes. This level of stratification is critical to understanding the productivity of the HCP area streams, their response to historical logging practices and natural disturbances, their habitat response over time, and their sensitivity to current logging operations.

2.2.1.1 Alpine Glacial

The *Alpine Glacial* LTU (8.5 percent of the Plan Area) is the land west of the divide between the West Fork Satsop River and Schafer Creek and north of Carter Creek, encompassing the Wynoochee River and its tributaries, exclusive of those segments that lie in the CUP. Glacial deposits of gravels, sands, silts, and clays native to the Olympic Mountains are prevalent in this unit. Some of these deposits are highly cemented, and where they occur in stream banks are resistant to erosion, often maintaining a vertical or an undercut slope. Sediment is delivered to channels in this unit through gradual bank erosion and shallow rapid landsliding of accumulated soils on steep side slopes where channels cut through terraces of the ancient Wynoochee River. Channels with connections to steeper headwaters in the CUP receive sediment and wood from catastrophic processes (mass wasting and debris torrents) common to that LTU. In stream segments whose banks are composed of resistant glacial till, recruitment of woody debris from on-site is principally through windthrow or shallow-rapid landslides rather than bank undercutting and channel migration.

2.2.1.2 Crescent Islands

The *Crescent Islands* LTU (11.8 percent of the Plan Area) is the area directly to the south and west of Shelton encompassing the watersheds of Mill Creek above Lake Isabella, Kennedy and Skookum Creeks and parts of Goldsborough, Wildcat and Cloquallum Creeks. Principal topographic features of this unit are the basalt "islands" around and between which flow low gradient, gravel rich stream systems. These islands were overridden by the continental ice sheets as evidenced by the glacial drift overlying their slopes. The thickness of these non-native deposits thins with increasing elevation. Recessional melt pathways were established through this area as the glacial meltwater flowed initially to the south, exiting through the Chehalis River and Grays Harbor. Significant deposits of unconsolidated sand and gravel characterize present day channel banks and lower terraces. The ample supply of foreign granitic gravels makes these low gradient channels excellent spawning habitat for chum salmon, and their low gradient pool riffle channel bed morphology makes them very productive for coho salmon. However, the unconsolidated character of their stream banks makes them susceptible to inputs of fine sediments through bank erosion. Large woody debris is recruited relatively quickly along moderate to large channels through bank undercutting and channel migration.

Figure 3. Lithotopo unit boundaries in the Plan Area.

Note: this figure is available for viewing as a separate file.

2.2.1.3 Crescent Uplands

The *Crescent Uplands* LTU (10.7 percent of the Plan Area) is an area of the southern Olympic foothills composed of massive basalt and breccia rock types. This unit runs across the northern tier of Simpson's ownership and also encompasses portions of the adjoining USFS lands. The headwaters of Bingham, Dry Bed, and Rabbit Creeks are in this unit, as are Vance Creek, the South Fork of the Skokomish River and its tributaries, the headwaters of the Middle and West Forks of the Satsop River, and parts of the upper Wynoochee River and its tributaries. The dominant sediment delivery processes in this unit are debris torrents and shallow rapid landslides. The CUP landscape is highly dissected, resulting in high drainage density and a high degree of connectivity between the logging road system and the channel network. Woody debris recruits to the channel mainly through catastrophic processes with some addition of individual trees or small groups from localized streamside slope failures. These catastrophic log recruitment processes, in combination with the highly confined channels, can result in large valley logjams. Runoff patterns tend to be rapid due to the shallow nature of soils and underlying bedrock. Much of this LTU lies at elevations that make the occurrence of rain on snow ("ROS") events more likely.

2.2.1.4 Recessional Outwash Plain

The *Recessional Outwash Plain* LTU (44.9 percent of the Plan Area) encompasses the extensive area of low relief extending from Mason Lake, north and east of Shelton, to the area west of Shelton, south of the CUP, and east of the SIG. This unit was formed by repeated advances of continental ice sheets and resultant recessional outwash during the Pleistocene period. Its soils are rich in sediments (stratified gravels, sands, silts and clays) foreign to the Olympic Peninsula. Channels flowing across this unit have flat slopes and abundant gravel deposits stored in the channel bed and banks. For streams originating on the ROP, sediment and wood are only delivered via localized bank undercutting as no channel connection to steep headwater areas exists. In some parts of this unit, infiltration of rain is affected by impermeable glacial tills and as a result stream stage may rise and fall quickly in response to winter storms in spite of their otherwise low energy regime. In more southerly areas and especially to the west and along the Olympic Mountain front, channels are prone to intermittency. Ground water sources maintain strong flow in other major tributaries of the ROP (e.g. Stillwater River, Bingham and Decker Creeks).

2.2.1.5 Sedimentary Inner Gorges

The *Sedimentary Inner Gorges* LTU (24.1 percent of the Plan Area) comprises the area to the west of the divide between Decker Creek and the Middle Fork of the Satsop River and the divide between the Schafer and the West Fork of the Satsop River and south of the CUP. This unit extends south into Satsop River tributaries (Cook Creek) and cuts west in the Carter Creek basin south of the contact with the Olympic glacial outwash. Marine siltstones, mudstones, and sandstone characterize the lithology of the SIG. Soils are deep and highly erodible and the channel network is deeply incised. The entrenched nature of the channel network is the dominant characteristic of streams in this unit. Significant sediment delivery processes in this unit include massive deep-seated landslides of many ages, inner gorge side slope failures, (especially in the mudstone and siltstone reaches of the channel network), and shallow rapid failures of the channel side slopes in the sandstone channel segments. A unique feature of the bedrock in this unit is the unusually high rate of weathering as a result of desiccation and exfoliation in the summer and calving of side slopes from freezing and thawing and fluvial erosion in the winter. Woody debris recruits to the channel network in this unit catastrophically through side slope failures in the inner gorges and deep-seated landslides. Single tree recruitment as a result of bank recession also is a

significant contributor of wood to the channel system from lower floodplains and terraces where they occur within inner gorge settings. The deep soils and weathered bedrock of this unit retain water well resulting in many small perennial channels.

2.2.2 Stream Classification Systems

Regulators and physical scientists have developed numerous schemes to classify channels. In the Pacific Northwest the primary purpose for most of these systems has been to create a management framework for the application of riparian rules and regulations. These systems all have some basis in physical science, but they have largely been driven by arbitrary distinctions such as the presence or absence of salmonid fishes. Consequently regulatory focus and management guidelines have been established based on site level attributes rather than watershed and reach level processes. Recent work in this area has described entire channel networks from a process perspective (Montgomery and Buffington 1997). These new approaches have opened the way for the development of more sophisticated classification schemes that explicitly acknowledge the longitudinal and hillslope connections within channel networks in forested landscapes.

2.2.2.1 Washington Forest Practices Stream Types

The Washington State Forest Practices Act has 6 stream types (1, 2, 3, 4, 5, and 9). Type 9 is the designation for non-typed stream segments. These stream segments often occur at the tip of the channel network and field verification usually determines them to be Type 4 or 5. Stream Types 1-3 have fish, Types 4 and 5 do not. Simpson has identified 1,394 miles of stream in the Plan Area, all segments of which have a DNR stream type assigned to them in Simpson's geographic information system ("GIS"). Stream types have been verified through the latest data available (Quinault Indian Nation and Simpson Timber Co. unpublished data).

2.2.2.2 HCP Channel Classification Scheme

The approach to stream classification adopted by the HCP principally follows the process-based approach of Montgomery and Buffington (1997) and borrows from the Washington State Watershed Analysis method by grouping channel segments of similar confinement into what could loosely be referred to as "physical response classes." However, the HCP approach differs in that it explicitly addresses geology (and therefore the character of bed and bank materials) through stratification by LTU. The purpose of classifying the channel network is to facilitate the following four activities: (1) grouping channel segments by dominant physical processes and ecological roles, (2) assigning riparian strategies that reflect important riparian forest functions in different landscape settings, (3) mapping biological resources through Simpson's GIS, and (4) facilitating the allocation of channel assessment and monitoring resources.

Channel width, the degree of channel confinement, and channel bed morphology were used to classify each channel segment. Field surveys were conducted to identify the basic channel classes and then each segment was assigned a class through the GIS using a combination of the following variables: DNR stream type, geology, LTU, and channel slope. The GIS stream segment database has over 8,200 records, each one identifying a separate segment. Channel class names are constructed of the LTU acronym followed by alphanumeric characters. The letters indicate the lithology (C = Crescent formation basalt, L = Lincoln formation siltstones and mudstones, M = Montesano formation sandstone, Qa = alluvial sediments, Qc = deposits of continental glaciers, and Qo = deposits of Olympic alpine glaciers) and the number refers to the relative basin area typical of the channel class, however no direct correspondence exists between the number

and channel order as described by Strahler (1957). After the initial class assignments were made, maps were produced on which corrections were made based on field familiarity with the area and additional field verifications. This process resulted in 49 different channel classes for the Plan Area. Mileage for each channel class and the percentage of the class by DNR stream type is listed below in Table 3.

Even though many of these size/confinement/bed morphology classes may occur in multiple LTUs, the LTU helps describe physical channel processes and ecological roles. Since these conditions represent very different conservation opportunities, these channels are assigned a different channel class. For example, in the CUP there are *small, highly confined, forced step pool channels*. In the SIG *small, highly confined, forced step pool channels* also exist. However, the physical response to management in these channels and the ecological roles they fill are very different due to their occurrence in different geology, topography, elevation and hydrologic zones.

Simpson's channel classification approach facilitates the mapping of the biological communities in the Plan Area. In this way it is a practical tool for describing the motivation behind the conservation approaches and prescriptions. Some of the biological associations are very strong. For example the SIG-L4 channel segments are important for steelhead spawning and rearing. They are also virtually the only segments that support riverine breeding western toads. Similarly the CUP-C1 channel class is the principal habitat of the Olympic torrent salamander while SIG-L2 channels often support isolated (above waterfalls) populations of riffle sculpin. The channel classification system also provides a convenient framework for assigning riparian prescriptions, evaluating riparian forest functions, managing stream habitat data, and understanding the longitudinal linkages in the channel network.

2.3 BIOLOGICAL CONTEXT

2.3.1 Aquatic Species

Attached as Appendix A are brief descriptions of the habitat requirements and distribution in the Plan Area for the 30 aquatic dependent species covered by the Plan. Species have been grouped by “associations” that represent groups of species occupying similar reach or segment levels of the channel network. This grouping facilitates the association of species with such landscape features as the dominant hillslope and channel processes that are associated with different reaches of the channel network and as such provides insight into the formative processes for their habitats. Since management prescriptions are targeted at forest management activities that often upset the natural balances of these processes the grouping also establishes a linkage between species associations and management prescriptions. Similar microhabitats of the same channel class may be used by members of a species association for completion of different life history requirements. For example, in some of the mainstem rivers of the Plan Area, western toads use the same slackwater habitat for breeding as juvenile steelhead and coho during the colonization phase of their early stream residence. These habitats are created by the same physical processes and support several species but in different ways.

2.3.2 Wildlife Species

Appendix A also includes brief descriptions of habitat requirements and surveys conducted within the Plan Area for wildlife species addressed by this HCP (Table 2).

Table 3. Miles of each channel class by current DNR stream type.

			DNR Stream Type (miles)					
Channel Class	**Class Character**	**Class Miles**	**1**	**2**	**3**	**4**	**5**	**9**
AGL-Qa6	Lg, UC, PR	12.7	12.5	0.2	0.0	0.0	0.0	0.0
AGL-Qo1	Sm, HC, SP_f/SP	61.3	0.0	0.5	10.4	7.6	24.6	18.2
AGL-Qo2	Sm, MC-UC, PR_f	22.5	0.0	0.0	7.9	3.5	3.7	7.4
AGL-Qo3	Sm, HC, PR_f/SP_f	7.3	0.0	0.4	2.5	2.0	0.4	2.0
AGL-Qo4	Md, UC, PR_f /PB	2.6	0.0	0.0	0.0	1.6	0.0	1.1
AGL-Qo5	Md, HC, PR_f	8.8	0.0	0.9	7.4	0.4	0.0	0.0
AGL-Qo6	Md, HC-MC, PR_f/PB	13.6	1.2	7.4	5.0	0.0	0.0	0.0
AGL-Qo7	Lg, HC, PR/PB	3.7	3.1	0.0	0.6	0.0	0.0	0.0
AGL-Qo8	Lg, HC, SP/PB	5.2	5.2	0.0	0.0	0.0	0.0	0.0
CIS-C1	Sm, HC, SP_f	83.9	0.0	0.0	5.0	2.8	24.4	51.7
CIS-C5	Md, MC-UC, PR_f/PB	1.7	0.6	0.0	1.1	0.0	0.0	0.0
CIS-Qc1	Sm, HC, SP_f	33.3	0.0	0.0	1.0	1.5	8.8	22.1
CIS-Qc2	Sm, MC-UC, PR_f	28.0	0.4	0.1	8.5	3.0	4.4	11.6
CIS-Qc3	Md, UC, PR_f/PR	16.8	6.3	9.7	0.8	0.0	0.0	0.0
CUP-C1	Sm, HC, Cas/BD	199.9	0.0	0.0	1.7	55.6	74.1	68.6
CUP-C2	Sm, HC, SP/Cas	22.9	0.0	0.0	3.3	17.6	2.0	0.0
CUP-C3	Sm, HC, SP_f/SP	24.5	0.0	0.4	11.2	10.6	2.1	0.3
CUP-C4	Md, HC, SP/BD	4.9	0.5	0.1	4.2	0.1	0.0	0.0
CUP-C5	Md, MC, SP_f/PB	3.5	0.6	0.1	2.8	0.0	0.0	0.0
CUP-C6	Md, HC, SP/PB	3.6	2.8	0.0	0.1	0.6	0.1	0.0
CUP-C8	Lg, HC, SP/PB	5.9	5.9	0.0	0.0	0.0	0.0	0.0
ROP-C7	Md, UC, BR/PB/PR_f	9.4	0.0	1.0	7.8	0.2	0.0	0.5
ROP-Qa7	Lg, UC, BR	3.7	3.7	0.0	0.0	0.0	0.0	0.0
ROP-Qc1	Sm, UC, PR_f	167.3	0.0	2.4	33.9	32.5	36.7	61.8
ROP-Qc2	Sm, HC, PR_f /SP_f	103.4	0.0	0.1	8.4	14.4	21.3	59.2
ROP-Qc3	Md, UC, PR_f/PR	44.2	18.8	13.4	11.8	0.0	0.0	0.3
ROP-Qc4	Md, HC, PB/PR_f	9.1	0.8	1.1	7.2	0.0	0.0	0.0
ROP-Qc5	Md, HC, PB/PR_f	12.1	10.8	1.3	0.0	0.0	0.0	0.0
ROP-Qc6	Md, UC, PR	9.5	9.3	0.2	0.0	0.0	0.0	0.0
ROP-Qc7	Lg, MC, PR/BR	15.2	14.1	0.0	1.1	0.0	0.0	0.0
ROP-Qc8	Lg, MC, PR/PB	2.8	2.8	0.0	0.0	0.0	0.0	0.0
SIG-L1	Sm, HC, SP_f	160.0	0.0	0.0	8.0	6.5	57.7	87.8
SIG-L2	Sm, MC,PR_f/PR	38.5	0.0	0.3	15.3	8.2	6.2	8.5
SIG-L3	Md, HC, SP_f/BD	6.3	0.0	0.5	5.0	0.7	0.2	0.0
SIG-L4	Lg, HC, PR/PB	24.2	22.8	1.5	0.0	0.0	0.0	0.0
SIG-M1	Sm, HC, SP_f	67.8	0.0	0.0	3.9	4.8	33.3	25.8
SIG-M2	Sm, MC, PR_f	18.5	0.0	0.0	7.7	4.9	4.1	1.8
SIG-M3	Md, HC, BD /PR_f	9.6	0.0	0.0	7.2	1.8	0.6	0.0
SIG-M4	Md, MC, BD/PR_f	6.0	1.1	1.4	3.5	0.0	0.0	0.0
SIG-M5	Lg, HC, PR/PB	15.1	15.1	0.0	0.0	0.0	0.0	0.0
SIG-M6	Md, UC, PR	2.3	0.0	0.9	1.4	0.1	0.0	0.0
SIG-Qa6	Lg, UC, PR	11.3	11.3	0.0	0.0	0.0	0.0	0.0
SIG-Qc1	Sm, HC, SP_f	12.8	0.0	0.0	1.7	2.4	6.6	2.1
SIG-Qc2	Sm, MC-UC, PR_f	8.9	0.0	0.0	3.2	0.4	3.3	2.0
SIG-Qc3	Md, MC-UC, PR_f	9.1	1.2	1.1	6.2	0.0	0.0	0.5
SIG-Qo1	Sm, HC, SP_f/SP	38.3	0.0	0.0	2.6	5.7	16.7	13.3
SIG-Qo2	Sm, MC-UC, PR_f	19.0	0.0	0.0	10.3	4.4	3.0	1.4
SIG-Qo3	Md, HC, PR_f/SP_f	4.8	0.0	0.0	4.7	0.2	0.0	0.0
SIG-Qo4	Md, MC, PR_f/PB	2.0	0.0	0.0	2.0	0.0	0.0	0.0
Totals		**1397.8**	150.8	45.0	226.3	193.8	334.1	447.9

3 MANAGEMENT AND REGULATORY CONTEXT FOR THE HCP

3.1 MANAGEMENT ACTIVITIES ADJACENT TO THE HCP AREA

Simpson's HCP is only one of several management, planning, and regulatory tools governing forest practices in southern Olympic Peninsula, Washington. Washington State has adopted Forest Practice Rules identifying "Best Management Practices" ("BMPs") required for forest practices within the State. These BMPs are generally applicable to all forest operations. In addition, both Port Blakely Tree Farms, L.P. and the Washington State Department of Natural Resources have prepared habitat conservation plans governing harvests on forestlands in the vicinity of this HCP. The forestlands immediately to the north of Simpson's Plan Area are owned and managed by the USFS in accordance with the "1994 Northwest Forest Plan". The longitudinal connections via the major north-south trending river valleys provide substantive physical interactions and habitat connectivity between the Federal properties and the Plan Area.

This HCP generally consists of a contiguous block of Simpson land surrounded by a matrix of lands owned by federal, state, tribes, large timber companies and small private landowners. Figure 2 identifies these ownerships and their juxtaposition to the HCP area. Any assessment of the impact of Simpson's proposed management activities on fish and wildlife in the Plan Area must be made in the context of a broader analysis of the impacts resulting from this mosaic of ownership and land management practices. The following provides a general overview of the land ownership pattern and their percentage of total lands within five miles of the HCP boundary.

Northern Boundary: Olympic National Forest (95%); City of Tacoma (3%); small landowners (2%).
Western Boundary: Weyerhaeuser (32%); Rayonier (30%); John Hancock Mutual Life Insurance (15%); Olympic National Forest (10%); City of Aberdeen (5%); Port Blakely Tree Farms L.P. (3%); Mason County (2%); small landowners (2%); and Washington State Department of Fish and Wildlife (1%).
Southern Boundary: Weyerhaeuser (35%); Washington State Department of Natural Resources (25%); Port Blakely Tree Farms L.P. (20%); and small landowners (20%).
Eastern Boundary: Small landowners (95%); and Skokomish Tribe (5%).

3.2 MANAGEMENT DESCRIPTION

The following are brief descriptions of management practices implemented by the primary landowners adjacent to the Plan Area.

3.2.1 Olympic National Forest

The Hood Canal Ranger District of Olympic National Forest (ONF) makes up a majority of the land ownership adjoining the HCP northern boundary. A majority of that land was clearcut harvested from 1973 to 1985, and those lands currently consist of timber stands approximately 10-20 years of age. Some relatively small blocks and corridors (less than 200 acres) of old-age forests (greater than 100 years old) are present in Skokomish, Canyon, Satsop and Wynoochee River drainages. The following identifies and describes the future management proposed for the ONF.

3.2.1.1 Land Management Allocations

There are two Land Management Allocations on ONF lands, within ten miles of the HCP boundary: Adaptive Management Areas (AMA) and Late-seral Reserves (LSR) (Figure 4).

Adaptive Management Areas (AMA) AMAs consist of approximately 60 percent of the ONF lands within ten miles of the HCP northern boundary. Land management in AMAs is directed at developing and testing innovative approaches to forest stand and landscape level management while also working towards ecological and economic objectives. Management in these areas includes developing or restoring forest and stream habitat complexity by using silvicultural practices, such as long harvest rotations and partial retention.

Late-Seral Reserves (LSRs) - LSRs consist of approximately 40 percent of the ONF lands within ten miles of the HCP northern boundary. Management in these areas protects and enhances old-growth and other late-successional forest communities. Most forest harvest actions are restricted from these lands, although some forest thinning and limited road building may occur.

3.2.1.2 Key Watersheds

Four Key Watersheds have also been identified by the ONF in areas within ten miles of the northern HCP boundary: Wynoochee, West Fork Satsop, Canyon River and South Fork Skokomish River. These watersheds have: 1) habitat for potentially threatened species or stocks of anadromous salmonids or other threatened fish; or 2) greater than six square miles with high-quality water and fish habitat. Some Simpson lands are included within the Wynoochee and South Fork Skokomish Key Watersheds due to the high level of concern for water quality and native fish (Figure 4). These private land inclusions are advisory only, and they do not carry regulatory restrictions for private landowners.

Key Watersheds are not a land management allocation. However, management within these areas must be directed at meeting the nine Aquatic Conservation Strategy (ACS) principles, as defined in the Northwest Forest Plan (USDA and USDI 1994).

Those principles are:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of aquatic systems to which species, populations and communities are uniquely adapted.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections including flood plains, wetlands, upslope areas headwater tributaries, and intact refugia.

3. Maintain and restore the physical integrity of aquatic systems, including shorelines, banks, and bottom configurations.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals comprising aquatic and riparian communities.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements include timing, volume, rate, and character of sediment input, storage and transport.

Figure 4. Olympic National Forest land management designations.

Note: this figure is available for viewing as a separate file.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak high and low flows must be protected.

7. Maintain and restore the timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.

8. Maintain and restore species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, channel migration, and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

3.2.1.3 Watershed Restoration

The Forest Service South Fork Skokomish Watershed Analysis Team has identified many watershed restoration projects. This team found approximately 2,500 management-related erosion features (600 mass wasting and 1,900 surface erosion) in the watershed, and 85 to 90 percent of these are road related. Since 1991 the Hood Canal Ranger District has been actively involved with watershed restoration projects on Forest Service lands in the South Fork Skokomish watershed, primarily in the following drainages: LeBar Creek; Brown Creek; Vance Creek and Rock Creek. The District has completed 150 miles of road decommissioning, which included: removing unstable landings and sidecast materials; removing culverts; reestablishing stream channels; installing cross ditches; and modifying road beds to resemble original contours. They also have completed 80 miles of road stabilization, which included removing unstable landings and side cast material; modifying road prisms to resemble the original contours; and planting trees, shrubs and grasses on those sites. The District also has stabilized approximately 1,250 acres of unstable slopes by using a variety of techniques including revegetating; installing fiber matting and terracing slopes. The Hood Canal District has proposed further projects in the Cedar and Vance Creek drainages in 1999, which consist of 34 miles of road decommissioning; 39 miles of road stabilization, 250 acres of soil bioengineering; and planting approximately 70,000 trees. The District also proposes to decommission 2.9 miles of roads in the Wynoochee River drainage during 1999.

3.2.1.4 Critical Habitat

In addition to the above management categories, critical habitat has been proposed or designated for two federally listed species by the USFWS within the region. Portions of ONF immediately north of the Plan Area have been designated as critical habitat for the northern spotted owl and marbled murrelet. Critical habitat for both species generally follows LSR boundaries with some minor differences.

3.2.2 Timber Companies

A large portion of lands adjacent to the western and southern boundaries of the HCP area are owned and managed by three large timber companies: Port Blakely Tree Farms, L.P., Weyerhaeuser, and Rayonier Timberlands Operating Company. Weyerhaeuser and Rayonier manage a majority of their forestlands with 40-60 year clearcut harvest rotations and even-age reforestation. Port Blakely manages their lands in much the same manner; however, they have longer harvest rotations of 70-80 years for some of their stands.

Port Blakely obtained a Section 10 ESA HCP for approximately 7,500 acres of the Robert B. Eddy Tree farm, located approximately 18 miles south of the HCP area. The Port Blakely HCP covers 7 amphibian,

16 bird, and 9 mammal species, in addition to an unlisted species agreement covering other wildlife species that may become listed in the future.

Under Port Blakely's HCP, they will harvest approximately 6,386 acres of mature second growth. In addition, approximately 2,000 acres will be commercially thinned and about 70 percent of planted third-growth stands will be commercially thinned. Port Blakely will apply silvicultural prescriptions in the form of commercial thinning and wildlife leave-tree retention to maintain and develop wildlife habitats over the life of the plan. They will thin some forests to accelerate development of characteristics associated with late-successional habitats. In addition, the rate-of-harvest will be a variable rotation length to develop and maintain a wider range of successional stages across the HCP area. Currently most of the tree farm is in 50-60 year old stands which will be converted to a more even distribution of stands 20-50 years old by the end of the plan period.

3.2.3 Washington Department of Natural Resources

The Washington Department of Natural Resources (DNR) is trustee of 2.1 million acres of forestlands in Washington. A portion of those lands are within ten miles of the southwestern corner of the Simpson HCP area, within the Capitol State Forest. These lands and most other DNR forest lands are managed under a Section 10 ESA HCP issued in 1997. DNR's HCP management addresses all species currently listed: the northern spotted owl, marbled murrelet, grizzly bear, gray wolf, Aleutian Canada Goose, Columbian white-tailed deer, bald eagle, peregrine falcon, and Oregon silverspot butterfly. DNR's management includes provisions to protect murrelet habitat, spotted owl habitat, riparian corridors and special habitat types such as caves, talus fields, and large, structurally unique trees and snags.

3.2.4 Small Private Landowners

Small landowners within ten miles of the HCP area implement a wide range of forest and land management practices. A majority of these lands are managed with clearcut harvest and even-aged regeneration silviculture. A small percentage of these lands are managed with selective tree harvest or, in some cases, forest retention/conservation, particularly where forests are desired for residential areas. In general, these small landowners have not implemented conservation plans; however, they are obligated to follow relevant State forest practices regulations. Washington State Forest Practice rules identify BMPs required for forest practices within the state, and these BMPs are generally applicable to all forest operations on private lands. In addition, a matrix of small (typically less than 80 acres) private landowners are interspersed within the Simpson HCP area. These small parcels of private lands consist of small farms, residential areas, and forest lands. These forestlands also are managed according to Washington State Forest Practice Regulations.

3.2.5 City of Aberdeen Watershed

The City of Aberdeen owns a small portion of land within the Aberdeen Watershed adjoining the northwestern portion of the Plan Area. This watershed also incorporates approximately 1,500 acres of Simpson lands. Simpson manages its lands in the watershed in a manner that is consistent with the City of Aberdeen watershed needs. City of Aberdeen and Simpson representatives work together to arrive at agreeable management approaches to: road construction; road maintenance and use; timing of timber harvest; and road access. The management prescriptions outlined in Section 5 of this Plan are not inconsistent with the terms of the Aberdeen agreement.

3.2.6 Tribal Lands

The Skokomish and Squaxin Indian Reservations are located within the Plan Area. These lands are set aside for the exclusive use and benefit of Indian peoples pursuant to treaties, statutes, and executive orders. These reservations are governed by sovereign tribal governments, which have the right to regulate resources within their reservations, including fish and wildlife species. The Skokomish Tribe has some lands adjoining the northeastern portion of the HCP area, and some of those lands are managed with clearcut silviculture and even-aged reforestation.

3.2.7 City of Tacoma

The City of Tacoma operates two hydroelectric facilities within 1-2 miles of the HCP boundary. The Wynoochee Reservoir is located near the northwestern corner of the HCP area and the Cushman Reservoir is located near the northeastern corner of the HCP area. Both of these hydroelectric projects have lake drawdown periods. The Wynoochee project diverts water from the stream system approximately 2,500 feet from the dam to the power plant tailrace. The Cushman project diverts flows from the North Fork Skokomish River through a 2.5-mile tunnel that empties into Hood Canal immediately below the Cushman power plant. Both of these dams were constructed without fish passage structures. Mitigation measures including the trucking of fish from below the Wynoochee Dam and release into the upper reservoir allows for some anadromous fish migration. Negotiations are ongoing between the Skokomish Tribe, City of Tacoma, and the Federal Energy Regulatory Commission (FERC) involving the North Fork Skokomish River minimum flow standards and mitigation for impacts resulting from those hydroelectric facilities.

3.2.8 Olympic National Park

One of the largest landowners on the Olympic Peninsula region is the Olympic National Park, located in the interior of the Olympic Peninsula (within ten miles of the Plan Area). On its lands, the National Park Service is mandated to "conserve the scenery and natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." The National Park Service is mandated to promote the conservation of all federally listed threatened, endangered, or candidate species within the park or their critical habitats. Conservation of species and habitats within ONP plays a significant role in the sustainability of many wildlife and fish populations in the Olympic Peninsula Region.

3.3 RELATIONSHIP OF THE HABITAT CONSERVATION PLAN TO THE CLEAN WATER ACT

The prescriptions outlined in this Habitat Conservation Plan serve to address issues and concerns related to the Clean Water Act (CWA). To that end EPA and the Washington State Department of Ecology (DOE) have prepared a draft TMDL technical assessment report to address CWA concerns (attached to this document as Appendix G). These include ensuring compliance with State of Washington water quality standards. Water quality standards include numeric criteria, narrative criteria, characteristic uses and State antidegradation provisions. These standards are established at levels to ensure that a given waterbody (streams, lakes, wetlands, marine areas, etc.) supports its existing and designated characteristic uses. Uses may include but are not limited to: water supply; stock watering; salmonid migration, rearing, and harvesting; wildlife habitat; recreation; and commerce and navigation. Numeric limits are set for pollutants such as temperature, fine sediment and toxics while narrative criteria are established to protect against diminishment of aquatic habitat suitability for salmonids.

It is the intent of the conservation program outlined in this HCP to address water quality concerns in two ways: 1) improve water quality in areas where it currently is in poor condition due to management related

causes, and 2) maintain water quality in areas where it currently is in good condition through application of protective management strategies.

(1) 303(d) Listed Water Bodies - The CWA requires that water quality problems be identified where they occur. Simpson plans to initiate actions to understand the cause and effect relationships and promote recovery of elevated temperatures on the three stream segments currently listed on the State's 303d list of impaired water bodies. In the course of plan implementation and refinement, additional steps will be taken to identify and mitigate for conditions of elevated temperatures found on additional stream segments within the Plan Area. As outlined in the following sections, a monitoring plan will be developed to track the status and trends of stream temperatures and the effectiveness of recovery efforts.

(2) Anti-degradation - The CWA also requires that water quality standards include appropriate provisions to prevent additional, incremental damage to water quality and aquatic resources. This "anti-degradation" standard may be achieved by development and compliance with best management practices or related actions that are demonstrably effective in altering stream or watershed processes that control the expression of water quality. Simpson has developed a set of proposed forestry management practices (described in Section 5) that are keyed to the particular characteristics of their diverse landscape, and address the most probable mechanism that may place public resources at risk. These proposed practices go beyond current forest practices, and as such, present a more reliable basis for protection of current and future water quality and water resource integrity.

The ultimate effectiveness of Simpson's management prescriptions and the level and timeliness of plan implementation will be tracked through an ongoing provision for monitoring associated with this HCP. Information resulting from this monitoring program will provide the necessary feedback, at pre-defined points, to judge the adequacy of the plan, as a means of implementing the TMDL, and may be used to trigger changes (through adaptive management, see Section 10) in prescribed management actions.

3.4 CONTRIBUTION OF THE HCP TO REGIONAL SPECIES CONSERVATION

3.4.1 Listed Species

3.4.1.1 Chinook Salmon (Puget Sound ESU)

This ESU is inclusive of all Hood Canal and Puget Sound rivers and independent tributaries, including some in the eastern Strait of Juan de Fuca. Of streams within the Plan Area, the Skokomish River has always been the largest contributor and continues in that role today, although most of the production from the Skokomish is now of hatchery origin. The smaller tributary streams of Totten and Skookum Inlets and Oakland Bay historically were never more than a very small percentage of the overall ESU production and today, after decades of hatchery management in South Puget Sound and resultant poor wild escapements, can only be described as a minor remnant. The role of Plan Area streams in the recovery of this ESU must be considered a minor one based on the impacts of previous management and the relatively small production potential relative to the entire ESU. Locally, however, Plan Area streams represent dispersed production within the ESU and may be culturally valued for Tribal fishing. No special characteristics of runs in this ESU are documented for Plan Area streams and production is not remarkable from any other biological perspective.

3.4.1.2 Chum Salmon (Hood Canal Summer Run ESU)

The Hood Canal summer chum ESU is comprised of many small-population segments from the rivers and independent tributaries of Hood Canal. Production of summer chum occurs in the lower ends of streams

in the ESU because the fish arrive on relatively low flows in the early fall. Most of the production of summer chum in the South Fork Skokomish River is expected to occur downstream of the Plan Area. Plan Area activities have been conditioned to minimize downstream sediment effects. The Plan Area channel network will support recovery of this ESU principally through the production generated from the mainstem of the South Fork Skokomish River and any of its lower tributaries that may provide suitable habitat. This contribution will be roughly proportional to the occurrence of the habitat distribution within the ESU and is otherwise unremarkable.

3.4.1.3 Marbled Murrelet

The Washington, Oregon, and California marbled murrelet population segment was federally listed as threatened in September 1992 due to the substantial loss and modification of nesting (older forest) habitat and mortality from net fisheries and oil spills (USFWS 1997). This species had been identified by the USFWS as a recovery priority 3 species with high degree of threat and high recovery potential. The interim objective of the 1997 marbled murrelet recovery plan is to stabilize population size at or near current levels by: (1) maintaining and/or increasing productivity of the population as reflected by changes in total population size, the adult: juvenile ratio, and nesting success by maintaining and/or increasing marine and terrestrial habitat; and by (2) removing and/or minimizing threats to survivorship, including mortality from gill-net fisheries and oil spills (USFWS 1997).

The HCP area currently has approximately 900 acres of highly fragmented habitat that potentially may be used by murrelets for nesting. Although this habitat is highly fragmented, some of it could provide a small but valuable contribution to the Pacific Northwest murrelet recovery goals.

3.4.1.4 Bald Eagle

The Pacific Bald Eagle Recovery Plan was developed in 1986 to help guide restoration efforts in Washington and six other states. Goals of this recovery plan included: 1) a minimum of 800 nesting pairs; 2) average reproductive rate of 1.0 fledged young per pair, with a nesting success rate per occupied site of not less than 65 percent; 3) attainment of breeding population goals in at least 80 percent of the management zones; and 4) stable or increasing wintering populations.

Bald eagles have nested in the HCP area in the past and some winter communal roosting has occurred at one site. This type of use provides a valuable, albeit small, contribution to the overall conservation of this species recovery in the Pacific Northwest.

3.4.2 Species Proposed for Listing

3.4.2.1 Coastal Cutthroat trout (Southwestern Washington / Columbia River ESU)

Coastal cutthroat trout use a variety of habitat types and have an especially diverse repertoire of life histories. Consequently they are widespread within the Plan Area and occur in the smallest of perennial streams, a variety of wetland types and larger mainstems of appropriate character. The Plan Area will contribute significantly to the regional conservation of this species because Plan Area aquatic habitat is so diverse and the species apparently is adapted to use nearly all these different habitat types. Both overall numbers and life history diversity will be preserved and benefited by their use of the Plan Area. The Stillwater River is of especially high importance to this species and lies in the core of the Plan Area. Local residents report that this particular population segment has been especially hard hit by illegal nighttime bait fishing. However, the freshwater habitat is in excellent condition and should remain so under HCP management. Some native resident populations occur in the Plan Area above bedrock cascades and waterfalls and represent a small but valuable diversity in the regional conservation context.

3.4.2.2 Bull trout (Coastal Washington and Puget Sound population segment)

It is unlikely that the Plan Area will make a significant contribution to regional conservation or recovery of bull trout due to the restricted nature of their distribution in the Plan Area and the character of Plan Area streams. The principal aggregations of bull trout that connect to Plan Area channels are in the mainstem South Fork Skokomish River and the anadromous segments of its major tributaries (USFS unpublished data 1998). Little information exists that would pertain to the upper reaches of the Wynoochee and the several forks of the Satsop River, but data collected by the same team of USFS personnel did not find this species in surveys done in these segments.

Surveys conducted by Simpson in small headwater streams indicate no presence of bull trout above anadromous blockages. These surveys did document coastal cutthroat trout and riffle sculpin. It does not appear that bull trout exist in isolation above waterfalls in the Plan Area. This conclusion coincides with the results of the USFS surveys related above. Regional conservation of bull trout will primarily be supported by river segments in the upper South Fork Skokomish and the North Fork Skokomish above Lake Cushman. In both cases, habitat comes under substantial protection of the USFS and the ONP.

3.4.3 Candidate Species for Listing

3.4.3.1 Coho Salmon (Puget Sound / Straight of Georgia ESU)

Plan Area streams represent a very small contribution for the conservation of this ESU, however locally they are capable of providing a dispersed production component. Harvest and hatchery management in the past has led to relatively poor wild coho returns to the independent tributaries that constitute the principal Plan Area production opportunity. However, habitat in these low gradient tributaries appears to be capable of producing coho in good numbers provided the escapement is satisfactory. No remarkable stock characteristics have been identified for runs in the Plan Area and it is unlikely that the aquatic habitat potential is any greater than its occurrence in the overall habitat base for the ESU.

3.4.3.2 Coho Salmon (Lower Columbia River / Southwest Washington ESU)

The Plan Area can contribute significantly but not uniformly to conservation of this coho ESU. The West and Middle Fork Satsop Rivers and the Canyon River do not have a significant tributary network within the Plan Area for the production of coho salmon and their mainstems are not particularly conducive because of relatively severe confinement within inner gorges of SIG LTU. The Wynoochee River and several of its larger tributaries and the East Fork of the Satsop River system including the Stillwater branch are the primary coho production areas in the Plan Area for this ESU. These streams are as efficient as any at producing coho in the region and can form the core of a coho strong hold in the southern Olympics. Even though there has been significant hatchery intervention in the ESU in the past, the Satsop River maintains a relatively large and late running stock that is somewhat unique in an otherwise homogeneous group of coastal coho.

3.4.3.3 Pacific lamprey

Pacific lamprey are widely distributed along the coast of North America and breed in freshwater. The ammocoetes live in silt deposits of back eddies along river margins and migrate to the ocean between ages 4-6 where they are parasitic on fish. Plan Area mainstem rivers provide spawning and rearing habitat, as do all other coastal rivers. Nothing remarkable about the Plan Area would suggest a particular value over other areas in the region for this species.

3.4.3.4 River lamprey

River lamprey are widely distributed along the coast of North America and breed in freshwater, having a life history similar to the Pacific lamprey. They are also parasitic on fish as adults in the marine environment. Plan Area mainstem rivers provide spawning and rearing habitat, as do all other coastal rivers. Nothing remarkable about the Plan Area would suggest a particular value over other areas in the region for this species.

3.4.4 Unlisted Species (no ESA petition or determined unwarranted after status review complete)

3.4.4.1 Chinook salmon (Pacific Coast ESU)

Mainstem rivers and their larger tributaries support spawning by chinook salmon but there is nothing out of the ordinary about individuals occupying the Plan Area. The Plan Area will contribute to the regional conservation of this species proportionate to the habitat available to them. Nothing unique or remarkable exists about them with perhaps the exception of spring chinook on the Wynoochee and the South Fork Skokomish Rivers. These two runs may have been relatively small historically and have been all but extirpated today. The dam has affected the run in the Wynoochee and the run in the south Fork Skokomish began declining in the late 1950's from unknown causes. The Plan Area potentially could support relatively unique runs in these two areas when the limiting factors that have been responsible for their decline are eliminated.

3.4.4.2 Chum salmon (Pacific Coast ESU)

The East Fork Satsop River and its tributaries could make a significant contribution to the coastal chum ESU. Productive side-channel, tributary and mainstem habitats within the Plan Area are especially favorable. However, other factors such as run timing and body size are not remarkable and contribute nothing out of the ordinary to the ESU.

3.4.4.3 Cutthroat trout (Puget Sound ESU)

The small independent tributaries of the Plan Area in this ESU could make a solid contribution to regional conservation of the species but are not especially noteworthy. Habitat in these tributaries is somewhat less complex and there are fewer interconnecting wetlands than in the Stillwater/ East Fork Satsop systems. Consequently the life histories that are likely to be encountered may not be as variable as those in some other Plan Area streams. Their worth will be proportional to their occurrence in the ESU.

3.4.4.4 Dolly varden

The contribution of the Plan Area to Dolly varden conservation will be minimal. There does not appear to be any distribution within the smaller tributary network comprising the bulk of channel miles and only in the South Fork Skokomish River do there appear to be very many native char.

3.4.4.5 Pink salmon (Odd year ESU)

Pink salmon were never widespread in the Plan Area and it is unlikely that they will ever be a common species again. Populations in the Skokomish basin were apparently fairly significant at one time but have been depressed since the 1950's. Regional conservation will be primarily supported by tributaries of Hood Canal and Puget Sound substantially to the north of the Plan Area.

3.4.4.6 Steelhead trout (Washington Coast ESU)

Steelhead trout are supported by mainstem rivers and the larger tributaries of many Plan Area streams. The West Fork Satsop River has a relatively large bodied and late running wild run that represents a reasonably different and important local stock. Aside from that run, Plan Area streams and stocks are not noteworthy or remarkable.

3.4.4.7 Steelhead trout (Puget Sound ESU)

Nothing unique or remarkable about the fish or the habitat exists for steelhead in this ESU in the Plan Area. The contribution of Plan Area streams to steelhead production in this ESU may only be especially distinguished by the South Fork Skokomish River, which has excellent habitat above the canyon, and in the North Fork above its confluence with the South Fork. Production has been reasonably strong in these areas in the recent past and is expected to continue under HCP management.

3.4.4.8 Torrent salamander

The Olympic torrent salamander is known only from the Olympic Peninsula, the genus having been split into four distinct groups in 1992. The Plan Area lies at the southern edge of the northernmost group of these seep salamanders. This species occurs only in the small steep colluvial tributaries of the upper channel network and does not appear to exist outside the CUP in the Plan Area. The Plan Area is complementary in its support of this animal as the bulk of the range exists in the Olympic National Park where no management of its forest and stream habitat will occur.

3.4.4.9 Tailed frog

Tailed frog occur from southern British Columbia to northern California on the Pacific Coast, in the Cascades of Washington and Oregon and in the Blue Mountains of Oregon and further into Idaho and Montana. This species does not occur continuously across the Plan Area and several streams in the CIS support this species. These populations are isolated from the other more commonly occurring populations in the CUP and may represent important colonizers between the CUP landscape and the Black Hills to the south. Aside from this caveat, the Plan Area does not represent a unique conservation opportunity.

3.4.4.10 Cope's giant salamander

Cope's giant salamanders occur in southern British Columbia, throughout the Olympic Peninsula and southwest Washington and into northern Oregon. In the Plan Area they are broadly distributed with the highest densities occurring in small headwater streams of the CUP and the AGL. This species is the most cosmopolitan of the stream breeding amphibians and the Plan Area only represents one of many relatively common conservation opportunities within the species range.

3.4.4.11 Western redback salamander

Western redback salamander occur from southern British Columbia to southern Oregon and west to the Cascade crest. In the Plan Area they occur with regularity in all LTUs and are common in riparian settings under rotting wood and in loose talus. There is nothing special about individuals in the Plan Area that is remarkable and the Plan Area is only one of many forested opportunities for the conservation of this species.

3.4.4.12 Shorthead sculpin

The shorthead sculpin typically occurs at higher elevations than any of the other cottid species. In the Plan Areas it has a very limited distribution in some headwater streams of the CUP and the AGL. Due to its limited distribution in the Plan Area there is only a minor conservation opportunity. The populations in the Plan Area probably represent the southern most on the Olympic Peninsula and may be of interest in that context but are not otherwise remarkable.

3.4.4.13 Van Dyke's salamander

Van Dyke's salamanders have a distribution that is split into three parts, the Olympic Peninsula, the Willapa Hills and the southern Cascades of Washington. It is relatively uncommon in the Plan Area and only the northern most edge of the Plan Area is within its range. The Plan Area represents a small but significant opportunity for conservation of the species southern range on the Olympic Peninsula.

3.4.4.14 Riffle sculpin

The riffle sculpin occurs in a wide variety of coastal streams in Washington, Oregon and northern California. In the Plan Area this species is distributed in all LTUs and across a variety of habitat types even occurring as isolated populations above waterfalls. Isolated sculpin populations are not unique to the Plan Area but do represent locally interesting occurrences. This is the only remarkable feature of riffle sculpin in the Plan Area.

3.4.4.15 Coast range sculpin

The coast range sculpin occurs from southern California to the Aleutian Islands. There is nothing remarkable or unique about Plan Area populations or their habitat.

3.4.4.16 Reticulate sculpin

The reticulate sculpin occurs from southern Oregon to northern Puget Sound. There is nothing remarkable or unique about Plan Area populations or their habitat.

3.4.4.17 Speckled dace

The speckled dace is found west of the continental divide in North America and is common in Washington state. It is found more in tributaries and sometimes in riverine ponds and wetland channel segments than the longnose dace, which prefers the larger rivers. The Plan Area is not remarkable in the regional conservation context for this species.

3.4.4.18 Brook lamprey

The brook lamprey is widely distributed along the coast of North America and is found inland up the Columbia River to the lower Yakima River. It spends its entire life in freshwater and can be found in a number of low gradient channel classes in the Plan Area. Our surveys have documented its occurrence above waterfalls and bedrock cascades and it appears to be most common in the SIG. However, based on its widespread distribution there does not seem to be anything particularly remarkable or noteworthy about populations in the Plan Area. The streams of the SIG are rich in fine sediments that appear to be excellent habitat for this species and may represent an above average conservation opportunity.

3.4.4.19 Torrent sculpin

Torrent sculpin are found north into British Columbia from the mid Oregon coast and interior to northwestern Montana. This species prefers larger swifter streams and is common in such habitats throughout the Plan Area. From a regional conservation perspective there is nothing remarkable about populations or individuals in the Plan Area.

3.4.4.20 Longnose dace

Longnose dace are widely distributed in North America. In the Plan Area they are found in the mainstem rivers where the juveniles are found in late summer in shallow open habitats along the river margin. The adults show a preference for fast riffle habitats. Aside from these observations little is known about their use of the Plan Area but nothing in the literature suggests the Plan Area would be of exceptional value to their conservation.

3.4.4.21 Western toad

The western toad has disappeared from many of its previous breeding localities in the Puget Sound area. Several riverine breeding populations occur in the Plan Area and appear to be strong and may be relatively unique in their occurrence and breeding phenology. The populations in the Plan Area are an important group of animals and constitute a unique regional conservation opportunity for this species.

3.4.4.22 Prickly sculpin

The prickly sculpin is distributed broadly along the coast of North America. Although there is some variation in appearance and taxonomic traits over its range there is nothing remarkable about Plan Area individuals. The distribution of this species in the Plan Area is restricted to some wetlands and low velocity, sluggish streams and does not represent a unique or disproportionately important regional conservation opportunity.

3.4.4.23 Olympic mudminnow

The Olympic mudminnow is regionally important because it only occurs on the Olympic Peninsula. The Plan Area populations occur in isolated wetlands or sluggish streams with considerable aquatic vegetation and a muck substrate. The occurrence of this species in the Plan Area represents an important segment of an otherwise limited range.

3.4.4.24 Threespine stickleback

The threespine stickleback is a widely distributed fish and tolerates both marine and freshwater environments. In the Plan Area it is found in wetlands and sluggish streams and is sometimes found in isolated wetlands that have intermittent connections to the stream system. This species shows considerable phenotypic variation across its range and the populations of the Plan Area are of interest due to their isolated character. However, Plan Area populations are not critical to regional conservation of this species.

3.4.4.25 Northwestern salamander

Northwestern salamanders exist west of the Cascade Mountains from western British Columbia to northern California. This species requires lentic habitat for breeding which makes the wetland complexes of the Plan Area an especially valuable regional conservation asset; however, no remarkable traits of this species are represented by individuals in the Plan Area.

3.4.4.26 Long-toed salamander

Long-toed salamander are broadly distributed throughout the region extending from southeast Alaska into northern California and west to Montana. Two subspecies exist and the Plan Area supports the one

representative of the country to the west of the Cascade Mountains. This species requires lentic habitat for breeding which makes the wetland complexes of the Plan Area an especially valuable regional conservation asset; however, no remarkable traits of this species are represented by individuals in the Plan Area.

3.4.4.27 Red-legged frog

The red-legged frog occurs from southwestern British Columbia into northern California and as far upstream in the Columbia Basin as the White Salmon River. This species is nearly ubiquitous in the Plan Area and is quite abundant. There is nothing about the Plan Area population segment that is remarkable but the relatively high density of wetlands in the Plan Area provide an excellent anchor for the mid-latitudes of this species range.

3.4.4.28 Harlequin Duck

Harlequin ducks use large and medium sized, fast flowing rivers in the HCP area for breeding, nesting and rearing of young from April to September of each year. Harlequin duck populations in the Puget Sound Basin, and Western Washington as a whole, appear to be healthy and stable, whereas populations east of Washington have declined during recent years (refer to Appendix A for further details). The HCP area contains some high quality river ecosystems used by this species for reproduction. Continued availability of that high quality habitat will contribute to sustaining a healthy harlequin population in Western Washington.

3.4.4.29 Band-tailed Pigeon

Annual censuses of the band-tailed pigeons in Western Washington have shown that this population has significantly declined during at least the last 10 years (refer to Appendix A for further details). This decline is possibly due to a combination of the following factors: 1) winter habitat loss and degradation; 2) spring/summer habitat loss and degradation; and 3) over hunting. At this time it is difficult to tell how much of a contribution the HCP area provides to the conservation of this species; however, the HCP area is known to support at least a small portion of this population.

3.4.4.30 Roosevelt Elk

Roosevelt elk populations in the HCP area, and in western Washington, are not at this time in jeopardy and the population appears to be viable over the long-term. Additionally, this species is not considered a federal species of concern, and the WDFW has identified it as a game species. However, within the HCP area, the management of this species is of concern due to: (1) populations below ecological carrying capacity and possibly below harvestable carrying capacity; (2) the species is important to Tribes for hunting; and (3) the species is important to the public for hunting. This HCP will help maintain and potentially increase the existing populations of Roosevelt elk in the HCP area.

3.4.4.31 Snag Dependent Bird Species

The HCP addresses 15 bird species (Table 2) that rely on snags for nesting, and some of those species rely on snags as sources of forage. These species currently are not federally listed, although five species have been identified as Washington State Species of Concern or Monitor Species (western bluebird, purple martin, Pileated woodpecker, wood duck and common merganser). A majority of the low elevation forests in western Washington have been harvested at least once, and these forestlands generally have lower quantity and quality of snags for these snag species as compared with historical levels. However, the HCP area, along with neighboring forest lands, may contribute to the overall long-term survival of these populations in western Washington.

4 RESOURCE GOALS AND OBJECTIVES

The term "resource objectives or biological objectives" has been used in landscape and conservation planning processes to describe objective criteria that can be used to judge the success of the plan in meeting its stated purpose. In this general context, the term has been used to identify specific resources such as the condition or amount of particular habitat types, or even the distribution or density of animals of a particular species. Discussions about the utility of different objectives and their units of measure continue within management and regulatory circles. The purpose of this Section is to build a specific context for using the term "resource objectives" in this Plan, thereby avoiding any confusion on the subject that may be caused by more general external references.

4.1 "PRESCRIPTION" VERSUS "OUTCOME" BASED CONSERVATION PLANNING

A lack of specific biological objectives in some HCPs has been a cause for criticism of the habitat conservation planning process (e.g. see Kareiva et. al. 1999). This concern has led some to make a distinction between plans that are considered "prescription" versus "outcome" based. Recent changes in USFWS policies on HCPs seek to address this point. *Prescription based* plans assume that the management prescriptions implemented by the plan will accomplish the goals or objectives and make no explicit commitment to adjust practices should this not bear out. Perhaps more importantly, could be the lack of a commitment to monitor the outcome so that the results might never be known. *Outcome based* plans on the other hand explicitly identify measurable resource objectives (sometimes referred to as performance standards or targets) and also make allowances for adjustments to the prescriptions based on information to be obtained through monitoring. In an outcome based plan, if monitoring indicates the resource objectives have not been met within a specified time frame, management prescriptions are adjusted until the desired result is achieved. This process has come to be known as "adaptive management" (Holling 1978, Lee 1993). Consequently it has been argued that a plan which commits only to implementing the management prescriptions provides less certainty in the protection of biological resources, and falls short of the fundamental expectations of adaptive management and desired outcomes of the ESA.

Conversely, an outcome based plan will provide a landowner with little or no regulatory stability. In effect, the landowner is asked to do whatever it takes at whatever the cost to achieve preset desired outcomes. Since securing "regulatory stability" is often a landowner's primary goal in entering into an HCP, a strict outcome based approach may result in few, if any, landowners willing to proceed with an HCP. This is particularly true since an outcome based approach often suffers from insufficient scientific knowledge to set the "targets" with certainty. Moreover, the ultimate desired outcomes, i.e. enhanced populations of fish or other animals, will often be determined by factors beyond the control of any landowner. No matter what the landowner does and how much it spends the "target" may not be achievable.

Simpson's HCP attempts to steer a middle course between these two approaches. While it identifies measurable resource objectives and a monitoring program to track the outcome of management prescriptions, it caps its obligation to make adjustments to the initial set of prescriptions in terms of limits on the incurrence of additional costs and contributions of additional land. Simpson fully expects that the resource objectives will be achieved through implementation of the initial management prescriptions and that the outcome will be determined through monitoring. However, allowances have been made for adjusting the prescriptions as information becomes available through the monitoring program. Limitations on adjustments to the prescriptions are fully described in Section 10, Adaptive Management.

4.2 DESIRABLE ATTRIBUTES OF RESOURCE OBJECTIVES

Although the concept of setting "hard wired" resource objectives to judge success or trigger adjustments in management prescriptions is seductively simple, its execution in the world of industrial forestry, spanning a spatially and temporally variable landscape, is not. If the resource objectives are based on misguided assumptions or unrealistic expectations of how forested watersheds and channel networks function, they will frustrate land managers and resource advocates alike. Since most of the resources of the monitoring and research program of this HCP will be directed toward determining the status of the resource objectives, their measurement must provide not only information on the true condition and expected trends of the resources, but also on the efficacy of the management prescriptions.

There are some fundamental differences between how resource objectives can be set between terrestrial and aquatic systems. In mature terrestrial landscapes habitat is changing slowly (with the exception of catastrophic fires and wind storms), while riverine systems, because of the dynamic nature of flowing water, are constantly changing to local and distant inputs of wood, water, and sediment. In addition, the impacts of covered activities on terrestrial systems are direct (e.g. all the trees are cut down), while the impacts of covered activities on aquatic systems are almost always indirect through alteration of the character or quantity of watershed inputs. Therefore the units that are used to define terrestrial resource objectives may be quite different from those used for aquatic habitats (e.g. number of acres of forested habitat preserved or the number of snags present per unit area of remaining forest).

Aquatic resource objectives should lie as far up the chain of physical or ecological *cause and effect* as possible (i.e. physically or relationally close to source area material inputs). Unless this is done, it may be impossible to associate observed conditions with causes because cumulative effects or legacy effects of past practices may obscure proximate relationships. Ideally the resource objectives should be described in a currency that operates as an early warning system of impending ecosystem damage rather than an after the fact confirmation of unintended consequence or undesirable change. Moreover, information gained from monitoring the status of resource objectives must be capable of discriminating between unintelligible variance around a variable and a real signal of adverse change. For example, making assumptions about the ideal number of pools, their spacing and depth, or about the ideal number of pieces of large woody debris – and applying these "targets" in a blanket fashion to streams across the landscape, will do little to reflect inherent versus induced variability, nor address what factors are responsible for the present conditions.

4.3 THE CASE FOR ALTERNATIVE RESOURCE OBJECTIVES

Considerable knowledge about how watersheds function in forested landscapes of the Pacific Northwest has been accumulated over the last two decades (Naiman and Bilby 1998). Watersheds and channel networks are highly variable, responding to random and highly improbable natural disturbance events that operate on overlapping scales of space and time. These patterns make prediction of habitat condition at any given point in time or space very problematic. Therefore, the very nature of aquatic and riparian systems renders them incompatible with the traditional "engineering standards" model of evaluation based on narrow tolerances of condition or state. Nevertheless there remains a legitimate need to set some kind of standard to reinforce the traditional approach to resource protection that is based only on implementation of best management practices ("BMPs").

4.3.1 Animal Distribution or Density

Perhaps the most problematic resource objective from Simpson's position is one that would be cast in terms of animal distribution or density. Depending on the particular species, many factors outside

Simpson's control and in fact outside the Plan Area strongly influence the distribution and density of aquatic vertebrates and indeed some terrestrial wildlife species. Perhaps the most extreme example of this situation is that of animals that migrate great distances. For example, the inter-annual abundance of adult Pacific salmon is controlled by multiple fisheries, natural marine predators, and variable ocean productivity, all of which operate entirely outside Simpson's sphere of influence. A resource objective constructed around the number of adult spawners would do little to measure the adequacy of Simpson's management prescriptions.

The density of fry and smolts in freshwater are likewise not useful because they are a function of complicated stock productivity relationships that include parent stock size, numerous habitat factors, and inter-annual variation of regional and local weather. Our ability to actually enumerate juveniles is imperfect, as is our ability to determine survival to specific life history stages such as egg to fry survival. For all these reasons the distribution and density of aquatic vertebrates are problematic units of measurement for resource objectives. For some terrestrial wildlife species that have relatively small home ranges, whose distribution within the Plan Area is known and whose habitat requirements are reasonably well-described, some measure of distribution or relative abundance may be more appropriate. However, even in these cases there remain questions about how competition or predation may affect density or distribution within a community context.

4.3.2 In-channel Conditions

A partial, but inadequate, solution to the standards dilemma is the application or comparison of reference conditions from unmanaged streams to similar managed settings (Peterson et. al. 1992, Woodsmith and Buffington 1996). Inherent variability in the expression of common instream habitat variables (such as residual pool depths, size and distribution of large wood debris) even in unmanaged wilderness streams confounds our ability to establish firm "target" values (Ralph et al. 1994, Rhodes et al. 1994, McCullough et al. 1996, Bauer and Ralph 1999 in prep.). This approach tends to require the application of such a large range of values that it becomes difficult to establish compliance or deviance from the reference standard.

However, used in concert with local knowledge about upslope and riparian conditions, in-channel indices do provide a useful suite of interpretive variables. The combined information may be used to strengthen an understanding of likely trends of aquatic habitat condition as long as they are viewed in the proper longitudinal and watershed context. This latter role may be fulfilled by implementing a stream habitat assessment program to collect these data for use with a more focused monitoring program directed at upslope and riparian conditions near the source of the watershed inputs.

4.3.3 Watershed Inputs

The wealth of new information about riverine systems has led to some major paradigm shifts about their management that represent substantial challenges to our contemporary framework of water resource protection and our regulatory institutions (Magnusun et. al. 1996). The most significant of these changes is a shift away from trying to protect aquatic habitats with reach or site level conditioning of land use activities, to a focus on protection of aquatic habitats through management of watershed and channel network processes (Montgomery et. al., 1995). These processes are the "engines" that drive the expression of instream and riparian conditions that define the stream's productive capacity in any given year. This logic suggests that while in-channel indicators of habitat condition, (such as pool spacing, pool depth, wood loading, or the fraction of streambed gravels constituted by sands and fines), may be somewhat useful in describing current habitat conditions, they provide little insight into the adequacy of current management prescriptions or likely future conditions. Since Simpson is primarily interested in these latter two issues, the aquatic resource objectives must be cast in terms and units that are capable of providing insight into these issues.

4.4 PLAN AREA AQUATIC GOAL

The primary habitat goal of Simpson's HCP is to *conserve and develop intact, ecologically connected and naturally functioning aquatic ecosystems*. Aquatic systems with these three characteristics will be complex and have the capacity for self-organization, which are hallmarks of healthy ecosystems (Norton 1992). The aquatic resource objectives then should relate to natural functions and processes of watersheds and channel networks and their ecological connectivity.

4.4.1 Plan Area Aquatic Resource Objectives

To achieve these conditions it is necessary to reduce the occurrence of management related disturbances across the landscape and create watershed conditions that will enable natural disturbance processes to create habitat. To assist in focusing the management prescriptions and the research and monitoring program four broad resource objectives were set that apply to the entire Plan Area.

1. Conserve and develop riparian forests consistent with the natural plant potential and disturbance regimes of riparian settings.

2. Maintain basin level hydrologic processes consistent with a naturally functioning landscape.

3. Control sediment inputs to the channel network to levels consistent with naturally functioning valley and hill slopes.

4. Maintain surface water temperatures consistent with a naturally functioning landscape.

4.4.2 LTU Specific Aquatic Resource Objectives

Since forest management activities impact the landscape of each LTU differently, each of the Plan Area resource objectives assumes different significance in each LTU. For example, with regard to objective number two, maintaining basin level hydrologic processes, the principal hydrologic management issue in the CUP is rain-on-snow events triggered by rapid snow melt; in the AGL, it is interception of shallow subsurface flow by roads; while in the SIG it is transfer of water by the road system between small catchments. Therefore we have found it not only desirable, but also necessary, to establish LTU-specific resource objectives in order to strategically focus our forest management prescriptions and the monitoring and research program.

Typically resource objectives are considered to be time and space specific and quantitative. Where possible we have identified them in these terms, but in most cases the monitoring and research program will inform this process as much as any a priori standards could. For example, while resource objective No. 2 for the AGL (Section 4.4.2.1) may not be time specific and does not have a "quantitative" target or standard associated with it, it clearly states a management intent about an important character of intact, ecologically connected, and naturally functioning stream systems. Based on this resource objective, the research and monitoring program (see Monitoring Question No. 6, Section 9.4.2.1) will investigate this condition, describing the extent and degree of the problem in the AGL, its likely past causes, and potential remedies and risks associated with each. This approach contrasts with the more speculative and "non-adaptive" application of quantitative standards applied to components, rather than processes, of the stream system. This latter approach would miss the really important long-term issues, continuing to focus on symptoms, never understanding and addressing the underlying cause that prevents full expression of aquatic habitat quality. Therefore, as long as the research and monitoring program is designed to refine our understanding of an objective and put it into a practical context for the Plan Area, the lack of time specificity and quantitative targets is not necessarily a weakness.

However, in the absence of time and space specificity and quantitative standards, the question may be raised: "How will it be determined when or even if the objective has been met?" The answer lies in the results of the integrated monitoring and research program (Section 9). In the case of less specific aquatic resource objectives, it will be necessary to derive information from multiple assessment, monitoring and/or research activities to evaluate whether an objective has been met. This task is not more difficult nor the conclusion less certain than in the case of hard targets; it simply requires a more integrated and holistic treatment of information and must be planned for in the early stages of the monitoring program.

Take for example LTU Specific Objective No. 7, "manage sediment supply, storage, and transport from the CUP landscape consistent with normal landscape and hillslope function." A number of pieces of information will be required including: estimates of the background rate of landslides and an understanding of their processes and triggering mechanisms, systematic landslide inventories, an assessment of channel sediment storage capacity and the functional linkages to riparian forests including woody debris inputs, some measurement of the sediment supply or transport signal from the canyon systems into downstream segments at the Olympic mountain front (perhaps best monitored by permanently monumented cross sections located to detect long term changes in bed elevation). Additional variables could be added that might enhance data interpretation such as the coincidental measurement of sediment grain size that is both in storage behind debris dams in the highly confined channel network of the CUP and the material that arrives at monitored cross sections beyond the mountain front. The final analysis in determining whether the objective has been met will rely on the results and trends associated with all these data.

Simpson has identified fourteen LTU-specific aquatic resource objectives in these particular landscapes. A much longer list of objectives could have been compiled. However, at this time Simpson has limited the list to objectives that have special significance because they are themselves critical or through their attainment, achieve others by default. Because objectives with obvious application to broad landscapes only are listed for one LTU, it does not mean it will be overlooked in the others, it simply means it does not have special emphasis in the other LTUs. For example, CIS resource objective No. 5 is important everywhere but in the CIS it is especially important because of highly deformable channel beds composed of unconsolidated sands and fine gravels which are common in the CIS. Conclusions regarding selection of the resource objectives were reached based on Simpson's stream assessment and monitoring program, three completed state of Washington watershed analyses, and several ad hoc projects conducted for the HCP.

The following LTU specific objectives further define and support the greater Plan Area aquatic objectives based on the particular characteristics of the LTU and habitat requirements of principal species associations present. They form what could be considered important subsets of the Plan Area aquatic resource objectives. These objectives are measurable and form the framework for assessing the effectiveness of Simpson's management prescriptions - separating the performance of current management practices from past practices, historical legacies, and natural variability.

4.4.2.1 Alpine Glacial

1. Maintain shallow subsurface flow pathways.

2. Reconnect functionally confined channel segments with their historic floodplains (special reference to the AGL-Qo6 and AGL-Qo7 channel classes).

3. Accelerate the development of coniferous forest stands (special reference to the AGL-Qo4 channel class).

4.4.2.2 Crescent Islands

4. Accelerate the development of coniferous forest stands (special reference to the CIS-Qc2 and CIS-Qc3 channel class).

5. Reconnect stream habitat by replacement or repair of culverts. [It shall be assumed that this objective is met if all stream crossings on fish bearing segments are designed and constructed to allow upstream passage of juvenile salmonids by year 7 of the Plan.]

6. Manage sediment supply and storm flow hydrology consistent with requirements for successful reproduction by large bodied salmonids (special reference to the CIS-Qc3 channel class).

4.4.2.3 Crescent Uplands

7. Manage sediment supply, storage, and transport from the CUP landscape consistent with normal landscape and hillslope function.

8. Manage processes that affect storm flow runoff pathways consistent with a naturally functioning landscape. [It shall be assumed that this objective is met if the duration of the 2 year recurrence interval flow is not increased by more than 50%.]

4.4.2.4 Recessional Outwash Plain

9. Reconnect functionally confined channel segments with their historic floodplains (special reference to the ROP-Qc3 channel class).

10. Eliminate detrimental levels of management-caused temperature increases.

11. Protect and maintain the functional integrity of wetlands.

4.4.2.5 Sedimentary Inner Gorges

12. Increase the extent of alluvial channel cover (over bedrock) in M3 and M4 channel classes. [It shall be assumed that this objective is met if by year 10 of the Plan a 25% increase in cover is observed.]

13. Maintain sediment supply from the SIG-L1, M1, and Qo1 channel classes within ranges consistent with “normal” channel and hillslope function.

14. Maintain mass wasting on inner gorges of channel classes SIG-L4 and M5 consistent with “normal” hill slope function.

4.5 WILDLIFE MANAGEMENT GOALS

Late-successional forests, riparian forests and snag habitat are some of the most limited wildlife habitats on industrial forest lands in western Washington, including the lands within the HCP area. The overall wildlife resource management goals of this HCP are primarily directed at conserving and developing those natural resources, as well as other habitats for specific species. These goals are:

1. To conserve and develop stream and wetland riparian wildlife habitats and upland habitats adjoining those areas;

2. To conserve and develop late-seral forests in select areas of the Plan Area;

3. To conserve and develop snag habitat, primarily within riparian ecosystems, wetlands and adjacent uplands in the Plan Area; and

4. To implement other conservation prescriptions for specific wildlife species.

4.5.1 Species Specific Resource Objectives

The following resource objectives apply to specific species that are singled out for special reference because of their ESA status or uncertainty about the controls on their distribution and population levels within the Plan Area. In these cases Simpson and the Services deem additional emphasis is appropriate and have established the following species specific measurable standards. These standards are based on one of two measurement units: 1) distribution or relative abundance of the animals, or 2) specific habitat parameters.

Bull trout:

The resource objective for bull trout is to maintain or increase the current distribution within the Plan Area. Simpson will inventory for bull trout using methods endorsed by the Services to complete the baseline distribution by year five of the Plan (in accordance with Section 9). Simpson will provide additional inventories to assess distribution in years 10, 20, 30, and 40 and will use the data to evaluate deviations from the baseline. If the baseline distribution has diminished at these check points, adaptive management discussions will be initiated and actions taken in accordance with Section 10.4.

Stream breeding amphibians: (Olympic torrent salamander, tailed frog, and Cope's giant salamander)

The resource objective for stream breeding amphibians is to maintain the current distribution and relative abundance within the Plan Area[3]. Simpson will survey annually for these species, (in accordance with Section 9) and at year 10, 20, 30 and 40 will assess whether or not there have been any significant declines[4] or reductions in range[5] If significant declines or reduction in range have occurred at these checkpoints, adaptive management discussions will be initiated and actions taken in accordance with Section 10.4.

Western toad:

The resource objective for the Western toad is to maintain the current distribution and relative abundance within the Plan Area.[6] Simpson will survey annually for this species, (in accordance with Section 9) and at year 10, 20, 30 and 40 will assess whether or not a significant decline [2] or reduction in range[3] has

[3] The current distribution and relative abundance of stream breeding amphibians within the Plan Area may be affected by factors outside Simpson's control; questions about apparent regional and global declines of amphibians are still unresolved and could confound local data if not taken into account (Wake 1991, Pechman and Wilbur 1994, Blaustein et. al. 1994). Consequently regional trends will be taken into account when evaluating trends within the Plan Area.

[4] Simpson will conclude that a significant decline in density has occurred if the relative density of animals on average becomes less than half of the pre HCP management levels.

[5] Simpson will conclude that there has been a significant reduction in range if more than half of previously occupied channel segments become unoccupied under HCP management.

[6] The Western toad has suffered significant declines over the last several decades throughout much of its range in western North America (Carey 1993). Regional trends must be taken into account for this species when evaluating trends within the Plan Area.

occurred. If significant declines or reduction in range have occurred at these checkpoints, adaptive management discussions will be initiated and actions taken in accordance with Section 10.4.

Snag-dependent bird species:

(Downy woodpecker, black-capped chickadee, red-breasted sapsucker, tree swallow, violet green swallow, hairy woodpecker, western screech owl, northern pygmy owl, whet saw-whet owl, northern flicker, Pileated woodpecker, chestnut-backed chickadee, wood duck and common merganser)

The resource objectives for these species is to provide at least 2 snags 12-24" DBH and 2 snags > 24" DBH per acre by LTU. In accordance with Section 9, Simpson will survey for snags in the RCRs and at year 20 and 40 present information sufficient to establish snag density at those checkpoints. If snag densities are lower than these targets at year 20 and year 40, adaptive management discussions will be initiated and actions taken in accordance with Section 10.4.

4.5.2 Other Covered Species

For all other covered species in Table 2 only, the biological objective is to create habitat conditions capable of sustaining or increasing their current populations. In these cases no initial specific animal or habitat based standards are established for the measurement of this objective. It shall be assumed that this objective is met if Simpson demonstrates compliance with Section 5.2. and 5.3. Where deemed appropriate, and subject to other priorities, the SAT may suggest specific distribution or habitat metrics for monitoring with respect to other covered species in Table 2.

5 MANAGEMENT PRESCRIPTIONS

5.1 GENERAL

Simpson's conservation program emphasizes the protection and development of riparian forests as a primary strategy for satisfying the requirements of Section 10 of the ESA. This basic riparian forest strategy is supplemented by management prescriptions designed to address unstable slopes, road construction, road maintenance and decommissioning, and certain harvest limitations to modulate runoff from rapid snow melt. The plan also includes a number of conservation measures developed for the benefit of identified wildlife species using the Plan Area including retention of a minimum number of trees where they are not provided by other conservation practices, the conservation of habitats and nest sites, seasonal and spatial limitations on certain forest practices and road closures in the Plan Area. This suite of management prescriptions is defined in this section, whereas the rationale for these prescriptions is described in Section 6.

Section 12 of the HCP and the IA describe certain criteria surrounding the addition of lands to the Plan Area. All of the management prescriptions and monitoring requirements, including road inventories, prioritization of road projects, and remedial road work as well as any other animal or habitat surveys that apply to the initial Plan Area (except as they may have been modified by adaptive management pursuant to Section 10), will be applicable to any lands that are added. The length of time and budget for accomplishing such tasks with respect to added lands shall be proportional to that required of the initial Plan Area.

The conservation program outlined in the following subsections has been developed by Simpson in discussions with the Services, the Environmental Protection Agency and the Department of Ecology for the State of Washington. The identified prescriptions were designed not only to satisfy the requirements of Section 10 under the Endangered Species Act but also with the expectation that implementation of such prescriptions would be consistent with the non-point source load allocation for thermal and sediment input into waters of the Plan Area as established by DOE and approved by EPA (the "TMDL"). While this Habitat Conservation Plan and the related Implementation Agreement are developed solely for the purposes of securing protection under the ESA, performance under this Plan (and the related IA) has been determined by DOE and EPA to be an adequate strategy for the implementation of the TMDL (as confirmed in that certain letter dated _____, from _____ (EPA) to _____ (DOE)). For example, the requirements with respect to the maintenance, repair and construction of roads which Simpson is agreeing to implement not only represent the "minimization" and "mitigation" required by Section 10 of the ESA but are also intended to have the effect of reducing sediment input to adjacent waters to the limits of the allocation established by the TMDL. In addition, the analytical approach described in the TMDL for protecting stream temperatures and reducing sediment input (i.e. evaluating the effectiveness of riparian prescriptions on protection of stream temperature and addressing forest road and hill slope related sediment input sources through management prescriptions) lends further support for the Services' analysis of this Plan and their conclusions that the implementation of the Plan will satisfy the requirements of the ESA. The monitoring program described in Section 9 will provide the required information to test fundamental assumptions and inform Simpson and the federal, state and tribal governments of overall plan performance. As described in Section 10, a process of adaptive management will be used to examine this information and make adjustments to plan prescriptions, within agreed limits, as circumstances warrant.

The following management prescriptions are organized in two categories: (1) prescriptions that address a wide range of habitat types and multiple species; and (2) additional prescriptions that address specific

wildlife species. These prescriptions will be applied by Simpson in the Plan Area for the duration of the plan except to the extent modified by the application of principles of adaptive management pursuant to Section 10 of this HCP or unless otherwise modified in accordance with the terms of the IA.

This Section does not contain an explanation or rationale for the management prescriptions nor does it set forth the benefits that are expected to accrue from their implementation. This omission is intentional. The document is organized to gather all prescriptions in a single section. The reviewer is directed to Section 6 for the correlative discussion of rationale. (The subsections in Section 6 are organized in a parallel fashion such that each subsection in Section 5 has a counterpart in Section 6 that specifically addresses the rationale of the identified prescription.)

5.2 PRESCRIPTIONS THAT ADDRESS MULTIPLE SPECIES

5.2.1 Riparian Conservation Reserve

Simpson will:

Establish riparian conservation reserves ("RCRs") in accordance with the following:

(a) RCRs boundaries shall be established on all channel segments in the Plan Area in accordance with prescriptions specified for each channel class in Appendix B, Table 25,Table 26and Table 27. RCR boundaries will generally be established as shown in Figure 5. The exact boundary locations of the RCRs and the LFRs shown in Figure 5 are approximate and the final boundaries will be determined in the field according to the riparian functional boundary (Appendix B, Table 26 and Table 27, Section 5.2.3) and unstable slope boundary (Section 5.2.5).

(b) Management activities inside the RCR will be restricted to those specified in prescriptions in Appendix B, Table 26and Table 27as applicable for each channel segment. None of these prescriptions shall preclude yarding corridors identified in Appendix B or road crossings that are consistent with Section 5.2.4.

(c) No salvage of standing dead or downed trees will be permitted in the RCR, described in Appendix B, Table 26and Table 27and Section 5.2.4.

5.2.2 Supplemental Wildlife Tree Conservation Program

Simpson will:

(a) Establish a wildlife tree conservation program that supplements trees retained for the Riparian Management Program (5.2.1), the Wetlands Conservation Program (5.2.3), and the Unstable Slopes Management Program (5.2.5) to ensure that the number of trees remaining throughout the Plan Area averages at least 8 trees per acre per section.

(b) Leave certain trees as habitat or potential habitat for wildlife species in accordance with the following:
- Leave a minimum of eight trees per acre of harvest.
- A minimum of four of the eight trees will be dominant or co-dominant trees.

- The other four trees may be any one or a combination of the following:

  - Cedar, hemlock, or other conifer with a live crown (7" minimum DBH).
  - Residual old growth.
  - Safe snags.

- Trees may be dead, dying, or green leave trees.
- Trees left in wetlands, riparian areas or on unstable slopes as a result of the riparian, wetland, or unstable slopes prescriptions will count towards the eight trees per acre.
- Trees may be clumped or dispersed within harvest units.

(c) The Supplemental Wildlife Tree Conservation Program will apply only in those sections highlighted in Figure 6.

(d) Prohibit the salvage of any residual "old-growth" downed wood or stumps throughout the entire Plan Area.

5.2.3 Wetlands Conservation Program

5.2.3.1 Wetlands Classification and Inventory

Simpson will:

(a) Complete an inventory and classification of all wetlands in the Plan Area within ten years of the issuance of the initial ITP; in classifying wetlands, Simpson will adopt the "hydrogeomorphic" ("HGM") approach for classifying wetlands that is currently used in the wetland functional assessment developed by the Department of Ecology for the State of Washington and will further stratify the wetlands based on "Cowardin" vegetation classes (see Glossary for definition of HGM approach and Cowardin vegetation classes).

(b) For each timber harvest unit which is to be harvested prior to the completion of the wetlands inventory and classification described in 5.2.3.1(a) above, inventory and classify any wetlands by hydrogeomorphic and vegetation characteristics at the time of Simpson's internal "timber harvest unit evaluation" for such unit.

(c) Complete a "local" watershed boundary delineation for all wetlands in the ROP within ten years after the issuance of the initial ITP for use in evaluating the effects of roads on wetland hydrology and establishing connectivity for fish distribution.

(d) Complete an evaluation of the existing road system to assess influences on the hydrologic integrity (including water quality) of all wetlands within the Plan Area within ten years after the issuance of the initial ITP.

(e) Establish a network of reference wetlands for the purpose of monitoring the spread of invasive exotic vegetation in wetland complexes. Such work will be a part of the habitat monitoring program and will be prioritized in accordance with overall commitments of that program.

Figure 5. Riparian Conservation Reserves (RCR) of the Plan Area.

Note: this figure is available for viewing as a separate file.

Figure 6. Predicted density of leave trees as a result of the Riparian (5.2.1), Wetland (5.2.3), and Unstable Slopes (5.2.4) prescriptions.
Areas shaded red are where the "Supplemental Wildlife Tree Conservation Program" (5.2.2) will apply.

Note: this figure is available for viewing as a separate file.

5.2.3.2 Wetlands Protection

Simpson will:

(a) Conduct certain remedial road work for the benefit of wetlands as provided in Section 5.2.4.2 below.

(b) Apply the "no-harvest" management prescription described below to all forested wetlands that are either (i) riverine wetlands or (ii) wetlands associated with unstable slopes and greater than one acre in size. (In all cases, logging and road building activity on unstable slopes shall be controlled by Section 5.2.5 of this Plan). "Forested wetlands" are wetlands whose tree canopy cover exceeds 30%.

(c) At Simpson's sole option apply either the "no-harvest" or the "50%-stem removal" management prescriptions described below to all forested wetlands greater than one acre in size in the Depressional HGM Class associated with a permanent or seasonal hydro-period; for purposes of this prescription, wetlands associated with permanent or seasonal hydro-periods are wetlands with standing water during at least one continuous month during the growing season.

(d) At Simpson's sole option apply either the "no-harvest", the "50%-stem removal", or the "compensating cut" management prescriptions described below to all other forested wetlands greater than one acre in size.

(e) Maintain buffers adjacent to non-forested wetlands in accordance with the following Table 4; as used in such table, references to "no harvest" and "50%-stem removal" management prescriptions are intended to be references to such prescriptions as described below. No buffers will be maintained for forested wetlands except as may result from the application of other management prescriptions such as the establishment of RCRs adjacent to channel segments or non-forested wetlands.

(f) As limited and set forth above, manage forested wetlands and wetland buffers in accordance with one of three prescriptions: "no-harvest", "50%-stem removal" or "compensating cut" management prescriptions:

- A no-harvest prescription precludes all timber harvest in any wetland or wetland buffer managed in accordance with this prescription other than timber harvest incidental to the construction of roads or yarding corridors.
- A 50%-stem removal prescription requires Simpson to leave in each forested wetland or wetland buffer managed in accordance with this prescription a number of trees roughly equivalent to the number of trees harvested from such forested wetland or wetland buffer. The trees left will have statistically similar size and species characteristics to the characteristics of the trees removed from such forested wetland or wetland buffer.
- A compensating cut prescription requires Simpson to identify compensating acres of forested wetlands which are or will be made subject to a no-harvest management prescription for the balance of the term of the Plan to compensate for the acres of forested wetlands being harvested in the wetland subject to this prescription. The compensating acreage will be identified in accordance with the following procedures:
  - At the time of any harvest of a wetland subject to a compensating cut prescription, Simpson will make a record of the acreage of wetlands so harvested and the size, density, and species of the harvested timber.
  - Periodically, but not less frequently than every three (3) years, Simpson will designate a comparable number of acres of forested wetlands in each LTU as being subject to a no-

harvest prescription for the balance of the term of the Plan. The acres so designated will contain timber statistically similar in size, density, and species characteristics to the timber previously harvested from wetlands in each LTU for which such compensation is being provided. Any such comparable acres of forested wetlands may be designated as compensating acres provided that no harvest of timber (including harvest under a 50%-stem removal prescription) has occurred on such acreage since the date on which the initial ITP was issued.

– The acres designated as subject to a no-harvest prescription will be so identified on Simpson's GIS for the balance of the term of the Plan. Maps of such protected forested wetlands will be provided to the Services through the Implementation Monitoring Program (Section 8).

- The attached Table 4 summarizes the management prescriptions applicable to different forested wetlands and wetland buffers

(g) When non-forested wetlands of any HGM class occur as a mosaic of small wetlands (i.e. the width of the matrix land between wetland features is less than twice the buffer width for their HGM class) the entire area will be managed as a "wetland complex" in accordance with the following:

- A perimeter buffer based on the most restrictive HGM class present in the complex will be established (see Table 4).
- Management of matrix land shall be subject to restrictions set forth in Table 4 for adjacent wetland features in the complex.
- Matrix land subject to harvest management may be designated as no-harvest RCR compensating acres in accordance with requirements and provisions of 5.2.3.2(g) above.

(h) Ensure that any use of ground based logging equipment in and around forested wetlands does not result in sediment delivery to public resources.

Table 4. Management prescriptions for wetlands in the Plan Area.

HGM Class	HGM Sub-class	Vegetation Class	Size	Timber Harvest/Buffer Prescriptions
Riverine	Flow through Impounding	Forested Scrub/shrub Emergent Aquatic bed	Any	No harvest will occur in riverine forested wetlands of either HGM sub-class; Buffers on riverine wetlands will be established consistent with management prescriptions for the establishment of RCRs.
Depressional	Outflow Closed	Forested	> 1.0 acre	If associated with a permanent or seasonal hydro-period[7], protection will be provided either by a no-harvest or a 50%-stem removal management prescription. If associated with an occasional or saturated hydro-period, protection will be provided by either a no harvest, 50%-stem removal, or a compensating cut management prescription.
	Outflow Closed	Emergent	> 0.5 acre	10 m buffer with a 50%-stem removal management prescription.
	Outflow Closed	Scrub/shrub	> 5.0 acres	Inner 10 m buffer with a no-harvest management prescription and an outer 10-meter buffer with a 50%-stem removal management prescription.
			0.5-5.0 acres	10 m buffer with a 50%-stem removal management prescription.
	Outflow Closed	Aquatic bed[8]	> 0.25 acres	Inner 10 m buffer with a no-harvest management prescription and an outer 30-meter buffer with a 50%-stem removal management prescription.
Slope		Forested	Any	If associated with unstable slopes, no harvest is permitted.
			> 1.0 acre	If associated with stable slopes, area may receive a compensating cut or 50%- stem removal management prescription.
Flats		Forested	> 1.0 acre	Protection will be provided by either a no-harvest, 50%-stem removal, or a compensating cut management prescription.
		All others	> 0.5 acre	Inner 10 m buffer with a no-harvest management prescription and an outer 10-meter buffer with a 50%-stem removal management prescription.

[7] Hydro-period defined:
Permanent hydro-period: Standing water year-round.
Seasonal hydro-period: Standing water at least one continuous month during the growing season.
Occasional hydro-period: Standing water less than one continuous month during the growing season.
Saturated hydro-period: Water table within one foot of the surface at least one continuous month during the growing season.
[8] Must have 0.25 acres of open water with characteristic floating or submerged wetland vegetation of this class.

5.2.4 Road Management Program

Simpson will:

Take those road remediation and maintenance actions described in the following subsections to hydrologically decouple and isolate roads within the Plan Area from the channel network.[9]

5.2.4.1 Road Inventory

Simpson will:

(a) Within 1 year after the issuance of the initial ITP, construct a database within Simpson's GIS for organizing, storing and reporting data developed during the road inventory. The database will be constructed so as to be useful in tracking ongoing road maintenance work, the development of short and long-term plans, the establishment of work priorities and the updating of such plans on an annual basis. (Further details relating to the development of Simpson's road inventory database are set forth in Appendix C.)

(b) Within six months after the issuance of the initial ITP, compile a list of problems known to Simpson personnel that are associated with any active, inactive or orphaned road within the Plan Area (the "Interim Inventory").

(c) Within five years after the issuance of the initial ITP, systematically collect data on standardized forms for each road segment (including legacy roads) and for each defined channel intersection that occurs within that segment for all roads in the entire Plan Area. These data will be compiled into a list of specific projects, which will constitute the "Complete Inventory" when added to the "Interim Inventory".

(d) Conduct a road monitoring project to determine the quantity of fine sediments delivered to the channel network from the road system (in accordance with Section 9).

5.2.4.2 Road Remediation

Simpson will:

(a) Within six months after the issuance of the initial ITP, identify and rank in priority of need for remediation, those road projects which were identified in the Interim Inventory; within five years after the issuance of the initial ITP, Simpson will identify and rank in priority of need for remediation, those road projects which were identified in the Complete Inventory.

- In establishing priority rankings, road projects with the greatest potential for adverse impacts on covered species and water quality will be selected as highest priority for remediation. Special scrutiny will be given to roads along valley bottoms, roads crossing unstable slopes, roads with high numbers of channel intersections that have either had a history of fill failures or may be susceptible to debris torrents and roads that significantly alter local hillside or channel drainage and flow patterns. The Scientific Advisory Team ("SAT") will be solicited for comments on remediation priorities.

[9] Among other results, the expectation of this program is that the LTU/channel class sediment load allocations identified in the TMDL will be achieved. These assumptions will be validated or rejected through the Monitoring Program (Section 9) and management prescriptions of the Road Management Program will be subject to the Adaptive Management process set forth in Section 10.

- Where Simpson chooses to retain road segments that lie tangential to the stream and are within the RCRs designated by Appendix B, Tables 28 and 29, the area covered by the "footprint" of the road and the cleared road right of ways shall be added to the RCR in nearby areas and shall be composed of trees similar in size and species characteristics as those that would normally be found at the site.

(b) Beginning in year one of the Plan and subject to the funding limitations set forth below, remediate roads based on the established priorities:

- At Simpson's option, the remediation of roads may involve "decommissioning" or "upgrading" such roads or rendering such roads "dormant".
- Notwithstanding anything in this Section 5.2.4.2 to the contrary, Simpson's obligations to remediate roads will not require the expenditure of more than $500,000 annually for the first 10 years of the plan or more than $250,000 for each year thereafter, provided that routine maintenance of active roads will be expensed out of Simpson's normal road maintenance budget without reducing amounts available for road remediation work. In some exceptional cases, an active road may suffer a catastrophic failure. For example, an undersized culvert may plug and cause a fill to wash out. A repair of such a failure will constitute "remediation" as long as the repair is done in accordance to new road construction standards and may be charged against the annual limits on road remediation expenditures. All such exceptional cases will be reported in the annual compliance report to the Services.

(c) For roads selected by Simpson for decommissioning, decommission the roads so that the hill slope function will return to a natural state and that natural drainage patterns will be re-established usually by application of the following management prescriptions:

- Fills and drainage structures will be removed.
- Side casts will be pulled back.
- Cut banks will be stabilized.
- The related road prism will be obliterated and revegetated.
- At least 50% of the road surfaces put into a "decommissioned" state (within the road closure areas identified in Section 5.5.5 below) during each calendar year will be seeded with a wildlife forage mix from certified mixes containing no noxious weeds such as tansy ragwort, reed canary grass or Canadian thistle.

(d) For roads selected by Simpson for dormancy (see Glossary), put such roads into a dormant condition by blocking vehicle access to them.

- Dormant roads will be cross ditched to the extent necessary to ensure that drainage functions are maintained.

(e) For roads selected by Simpson for upgrading, upgrade such roads using best management practices and techniques appropriate to the character of the problems being addressed; this work will typically concentrate on the causal agent rather than any specific symptoms of the problem; typical kinds of upgrading work expected to be conducted would include the removal of over-steepened sidecast that has developed tension cracks, adding relief culverts, constructing driveable dips, outsloping or crowning roads, armoring ditch lines, constructing catch basins in ditch lines, and replacing inadequately sized culverts and culverts that restrict the upstream movement of salmonid fishes.

5.2.4.3 Road Maintenance

Simpson will:

Maintain road surfaces on active haul routes in good condition (see 5.2.4.4(a) below);

(a) Conduct patrols of the road system during storms for the purpose of averting culvert blockages and other preventable maintenance problems;

(b) Promptly make all necessary emergency road repairs to active haul routes and conduct an analysis of each road failure to include: 1) a description of the failure, 2) an estimate of the amount of sediment delivered to any channels, 3) a determination of the triggering mechanism, and 4) a description of what measures were implemented in the upgrade to prevent a reoccurrence of the problem;

(c) Make all road repairs consistent with best management practices and the design standards for new road construction;

(d) Where operationally feasible, retain logs removed from culvert entrances and bridge piers in the channel network as close to their point of removal as possible. If it is impossible to retain them in this fashion they shall be stockpiled for later placement in other streams deficient in wood debris.

5.2.4.4 Road Use

Simpson will:

(a) Take appropriate actions to minimize surface erosion from active haul routes. The following are examples of the techniques that will be used but do not represent an exhaustive list (selection of appropriate techniques will be at Simpson's option): temporarily suspend hauling activities; improve competence of road surface; use road drainage features such as driveable dips or out-sloped roads to drain running surfaces; discharge ditch water onto a forest floor capable of filtering sediment prior to delivery to channels; and implement sediment trapping techniques within the ditch system such as catch basins and check dams.

(b) Provided that Simpson is able to enter into an appropriate Memorandum of Understanding with the Department of Fish and Wildlife for the State of Washington pursuant to which the Department would commit to provide gate signs and appropriate law enforcement measures to enforce road closures, keep road closure areas 1, 2, 3, 7, 9, and 12 (as shown in Figure 9 and Table 7) closed year round to all motor vehicle traffic other than motor vehicles used by Simpson personnel, contractors, Simpson authorized permit holders or others directly associated with the management of Simpson's land.

5.2.4.5 New Road Location, Design, and Construction

Simpson will:

(a) To the extent operationally feasible, avoid new road locations on steep slopes (>60%) with potential for delivery to streams, limit roads through riparian areas, minimize the number of channel crossings, and design roads to ensure continuity in subsurface flow pathways.

- Where new or reconstructed roads pass through riparian areas, the area covered by the "footprint" of the road and any cleared road right of way shall be added to the RCR in

nearby areas and composed of trees similar in size and species characteristics as those removed for road construction.

(b) Retain a qualified geotechnical expert and road engineer for analysis and design of any new road construction or road reconstruction in high risk areas.

(c) Construct all new roads in accordance with best management practices and the following standards:

- All permanent crossings of fish bearing streams shall have a natural stream bed and be designed for the upstream migration of juvenile salmonids.
- Size stream crossing culverts to the 100-year flow.
- Use driveable dips, crowning, or out-sloping to drain the running surface of new roads.
- Install flumes and/or energy dissipaters to prevent erosion at relief culvert outfalls where needed.
- Install, construct, and manage relief culverts and ditches to prevent the piracy and transfer of water between small catchments; relief culvert discharge will not be directed onto unstable areas but rather designed where possible to distribute water that accumulates on road surfaces and in ditch lines to areas where it may infiltrate stable slopes and reenter subsurface flow pathways rather than route quickly to channels.

5.2.5 Unstable Slopes Management Program

Simpson will:

(a) Apply the existing mass wasting prescriptions currently set forth in each of the following formal Washington State Watershed Analyses: Kennedy Creek, February 1995; West Fork Satsop River, November 1995; South Fork Skokomish River, October 1997. All such mass wasting prescriptions are hereby incorporated by reference. As these mass wasting prescriptions apply to the Plan Area they may only be modified through the adaptive management process identified in this Plan. Complete copies of the Analyses have been made available to the Services by Simpson and are available for public review upon any reasonable request made to the Services. A verbatim listing of all mass wasting prescriptions associated with the above-referenced Watershed Analyses appears in Appendix H.

(b) Within five years after the issuance of the initial ITP, complete an analysis of slope stability and potential mass wasting effects on channels, stream habitat and other public resources in the Plan Area where formal Watershed Analysis has not been conducted:

- The methods used for these analyses will be at least as rigorous and detailed as those required for a Level II Watershed Analysis under the Washington State methodology.
- The personnel performing these analyses will have qualifications that meet or exceed those required for certification to perform Level II Watershed Analysis under the Washington State methodology.

(c) Within five years after the issuance of the initial ITP, assemble a multi-disciplinary team of experts to establish appropriate management prescriptions for terrain units susceptible to mass wasting as identified in 5.2.5(b) above.

- Each such expert will have been qualified by the State of Washington to participate in the establishment of prescriptions under the Watershed Analysis as then generally used in Washington.
- A majority of such experts will not be Simpson employees or otherwise regularly retained by Simpson in connection with its forest management and harvest activities.
- Should disagreements arise during the establishment of management prescriptions, such disagreements will be submitted to the Washington Department of Natural Resources for arbitration and settlement.

(d) Apply the mass wasting prescriptions for unstable slopes within the Plan Area established by the multi-disciplinary team of experts referenced in 5.2.5(c) above.

(e) For portions of the Plan Area not covered by the Washington State Watershed Analyses identified in 5.2.5(a) above, apply prescriptions from these analyses to analogous mass wasting circumstances in the unanalyzed portions of the Plan Area until the analysis identified in 5.2.5(b) and the development of prescriptions identified in 5.2.5(c) have been completed.

5.2.6 Hydrologic Maturity

Simpson will:

Manage forest cover in the sub-basins in Table 5 (shown in Figure 7) such that hydrologically mature forests cover at least 50% of the area in each sub-basin and no more than 25% of the area in each sub-basin is covered by hydrologically immature forests.

Table 5. Basins of the CUP where harvest will be timed to prevent extensive coverage of immature forest canopy.[10]

Basin	Simpson Acres
830 Creek	1,084
Aristine Creek	1899
Devils Club Creek	811
Dry Bed Creek	1,543
North Mt. Creek	952
Save Creek	787
South Mt. Creek	860
Total	**7,936**

[10] Hydrologically mature forest cover refers to stands with greater than 70% total crown closure that are less than 75% deciduous. Hydrologically immature refers to stands with less than 10% crown closure and/or are greater than 75% deciduous cover. These definitions are taken directly from the methods used in the assessment of hydrologic maturity for watershed analysis in the State of Washington (Board Manual: Standard Methodology for Conducting Watershed Analysis, Version 3.0, November 1995).

5.2.7 Experimental Management

Simpson will:

(a) Within 5 years of Plan signing and subject to any contrary state law, establish an experimental pilot project to investigate operationally practical ways to add wood to streams for the purpose of increasing the complexity of fish habitat. Such work will be part of the habitat monitoring program and will be prioritized in accordance with overall monitoring and research commitments and costs.

(b) Within 5 years of Plan signing establish an experimental pilot project to investigate operationally practical ways to increase diversity and riparian function in hardwood dominated riparian forests. Such work will be part of the habitat monitoring program and will be prioritized in accordance with overall monitoring and research commitments and costs.

Figure 7. Small basins of the CUP that will be managed for hydrologic maturity.

Note: this figure is available for viewing as a separate file.

5.2.8 Supplemental Prescriptions for Changed Circumstances

Simpson will:

Implement supplemental prescriptions in certain changed circumstances. Such circumstances and applicable supplemental prescriptions are described in total in Appendix F.

5.3 PRESCRIPTIONS THAT ADDRESS SPECIFIC WILDLIFE SPECIES

So long as any of the following wildlife species are "covered species" under the IA, Simpson will implement the following management prescriptions.

5.3.1 Marbled Murrelet

Simpson will:

(a) Establish and implement the RCR program.

(b) Prohibit harvest in all occupied murrelet habitat currently existing or hereafter developing within the RCRs.

(c) Prohibit harvest in all occupied murrelet habitat outside the RCRs. For the purposes of this paragraph, and paragraphs (d) through (h) below, occupied murrelet habitat shall mean those areas of murrelet habitat identified by the 1995 Simpson habitat assessment that is determined to be occupied using the latest survey protocols approved by both the USFWS and the WDFW. The most recently approved protocol is defined in the Pacific Seabird Group ("PSG") document: *Methods for surveying marbled murrelets in forests* (Ralph et al. 1994), and as amended by the March 8, 1995 information letter (Ralph et al. 1995). Simpson will implement these survey protocols with ten surveys per year for two consecutive years during 1998 and 1999. Any murrelet habitat that is not found to be occupied based on the 1998 and 1999 surveys will be deemed to be unoccupied and no further surveys of these habitats will be required for the remaining term of the Plan. However, if at a later time, nesting is detected in previously surveyed habitats, the stands will be considered occupied.

(d) Limit timber harvest within 300 feet of any occupied murrelet habitat located outside of the RCR so that such harvest will not reduce the residual stand stem density within such 300 foot buffer to less than 75 trees per acre with 12 inches DBH or greater, including 5 trees greater than 20 inches in DBH, where they exist.[11]

(e) Refrain from timber harvest and road construction within 300 feet of occupied murrelet habitat where such habitat is within an RCR and where such buffer is located within in the RCR.

(f) Limit timber harvest or road construction within 300 feet of occupied murrelet habitat where such habitat is within an RCR and where such buffer is located outside of the RCR so that such harvest will not reduce the residual stand stem density within such 300 foot buffer to less than 75 trees per acre with 12 inches DBH or greater, including 5 trees greater than 20

[11] The width of the buffer zone may be reduced in some areas to a minimum of 200 feet and extend to a maximum of 400 feet as long as an average of 300 feet is maintained.

inches in DBH, where they exist. Provided, however, that Simpson need not protect more than 150 acres of such buffers which are located outside of an RCR over the Plan Area.

(g) Refrain from road construction, felling, bucking, cable yarding, helicopter yarding, tractor and wheeled skidding and slash disposal/prescribed burning within 0.25 mile of an occupied marbled murrelet site during the two hours after sunrise and the two hours before sunset from April 1 to August 31.

(h) Refrain from blasting at any time from April 1 to August 31 within 1.0 mile of an occupied murrelet site.

5.3.2 Bald Eagle

Simpson will:

(a) Establish and implement the RCR program (Section 5.2.1) and the Wetlands Conservation Program (Section 5.2.3)

(b) Comply with all Washington state rules (as such rules currently exist) regarding the conservation of eagle roost and nest sites (RCW 77-12-655; WAC 232-12-292).

5.3.3 Band-tailed Pigeon

Simpson will:

(a) Conserve all mineral springs found in the Plan Area with a minimum two acre no harvest conservation buffer.

(b) Refrain from aerial spraying of pesticides within 50 feet of surface water, including forested and all other wetlands greater than 0.25 acres in size provided that application of pesticides that target non-forage species and that have a minimal impact on primary forage species will be allowed.

(c) Refrain from targeting primary band-tailed pigeon forage plants (cascara, elderberry, wild cherry, Indian plum, or huckleberry) with herbicide spray on or over at least 50 percent of the area within timber management units that have a high percentage cover of these species provided that application of pesticides that target non-forage species and that have a minimal impact on primary forage species will be allowed; a high percentage cover for this prescription is defined as timber harvest units with greater than 20% of the management unit covered by these forage species when they are in full leaf.

5.3.4 Harlequin Duck

Simpson will:

(a) Establish and implement the RCR Program (Section 5.2.1) and the Wetlands Conservation Program (Section 5.2.3)

(b) Refrain from timber harvesting, road construction and blasting within 0.25 miles of known nesting harlequin ducks, unless an acceptable alternate distance and operation plan is agreed to by the Services and Simpson.

5.3.5 Roosevelt Elk

Simpson will:

(a) Establish and implement the RCR Program (Section 5.2.1).

(b) Keep road closure areas 1, 2, 3, 7, 9, and 12 (as shown in Figure 9 and Table 7), closed year round to all motor vehicle traffic other than motor vehicles used by Simpson personnel, contractors, Simpson authorized permit holders or others associated with Simpson land management, provided that Simpson is able to enter into an appropriate Memorandum of Understanding with the Department of Fish and Wildlife for the State of Washington pursuant to which the Department would commit to provide gate signs and appropriate law enforcement measures to enforce road closures.

(c) Seed at least 50% of the road surfaces put into a "decommissioned" state (within the road closure areas identified in Section 5.5.5 below) during each calendar year with a wildlife forage mix from certified mixes containing no noxious weeds such as tansy ragwort, reed canary grass or Canadian thistle.

(d) Limit logging truck traffic on the road adjacent to the Wynoochee elk pastures to June 1-October 31, with the condition that Simpson would be able to use the road for logging trucks during the month of November if unusual weather conditions prevent the completion of hauling before then. If November hauling is necessary, Simpson agrees to open and close gates, or otherwise staff the gates, so that they are closed except to allow log trucks through. This restriction does not apply to other motor vehicles used by Simpson personnel, contractors, Simpson authorized permit holders, and others associated with Simpson land management.

5.3.6 Purple Martin

Simpson will:

(a) Construct and install at least 4 multi-unit artificial nest boxes on that part of Lake Nahwatzel adjacent to Simpson owned lands, within 10 feet of the water.

(b) Annually record the number of pairs using the boxes and maintain the nest boxes.

5.3.7 Snag Dependent Species

Simpson will:

Establish and implement (a) the RCR Program (Section 5.2.1); (b) the Wildlife Tree Conservation Program (Section 5.2.2); and (c) the Wetlands Program (Section 5.2.3).

Figure 8. Late-seral forest reserves established in the Plan Area.

Note: this figure is available for viewing as a separate file.

Figure 9. Road closure areas in the HCP Plan Area.

Note: this figure is available for viewing as a separate file.

6 CONSERVATION PROGRAM EXPLAINED

6.1 GENERAL

Simpson's conservation program emphasizes the protection and development of riparian forests as the primary strategy for satisfying requirements of Section 10 of the ESA. Complementing the functional approach to riparian forest and stream habitat conservation are measures that address specific wildlife species. The management prescriptions in this HCP are expected to conserve riparian forests, improve water quality, prevent management related hillslope instability, address hydrologic maturity of small sub-basins, maintain and generate late-seral riparian forests and snags, and control human disturbance to wildlife species. The suite of management prescriptions described in Section 5 is expected to benefit a wide range of species that inhabit the Plan Area including others not listed in Table 1 or Table 2 and for which no ESA coverage is sought.

What follows is a brief explanation of how the management prescriptions are expected to provide these benefits. For ease of reference, the subsections of this Section 6 are organized to correspond directly to their counterparts in Section 5. For example, wetlands prescriptions which are set forth in Section 5.2.3 are expected to produce certain benefits, which are explained in Section 6.2.3. Table 12 provides a summary of the linkages between the aquatic species, the resource goals and objectives, management prescriptions, and the expected benefits from the conservation measures while Table 15 provides correlative information for wildlife species listed in Table 2.

6.2 EXPLANATION OF PRESCRIPTIONS THAT ADDRESS MULTIPLE SPECIES

6.2.1 Riparian Conservation Reserve

Riparian forests are some of the most diverse ecosystems in the forested landscape, providing habitat for many wildlife species in western Washington. The use of riparian areas by wildlife species is disproportionate to their overall occurrence in the landscape, making them especially critical areas to protect and increasing the conservation benefits for investments made there. These same riparian forests are critically important in providing the ecological components of healthy streams.

Aquatic ecosystems are strongly connected to the terrestrial landscape through which they flow. The streamside or riparian forest is the direct linkage between these two systems and the condition of the riparian forest along with the geomorphic setting, determines the character and quality of the aquatic habitat. Inputs from the riparian forest moderate, buffer, or control the physical, chemical, and biological processes within the channel network at several temporal and spatial scales. Mediation or maintenance of these physical processes and ecological functions is important for the survival of particular species and entire aquatic species associations.

The following functions of riparian forests are the focus of the Plan's management prescriptions: (1) wildlife habitat, (2) recruitment of woody debris to streams and forest floor, (3) shade and control of streamside air temperature, (4) stream bank stabilization, (5) detrital inputs, (6) capture of sediment and organic matter on the floodplain, (7) maintenance and augmentation of nutrient dynamics and processing, and (8) provision of nurse logs. The importance of any one of these functions at any given site will depend on its location in the landscape and in the channel network and/or the specific geomorphic context of the setting. The maintenance and development of these

functional interactions of riparian forests with the stream environment is the focus of the RCR and riparian guidelines.

A majority of the wildlife habitat conservation prescriptions proposed in this plan are concentrated in and adjacent to stream and wetland riparian ecosystems. These systems provide a network that extends throughout the planning area, and thus distributes these conservation benefits throughout the HCP landscape.

6.2.1.1 Scope and character of the RCR

Simpson estimates that a total of 28,922 acres or 11.1 percent of the Plan Area, will be included in the RCR (Table 6). The RCRs will be distributed throughout the Plan Area along all stream classes and will encompass riparian areas, wetlands, and some contiguous unstable upland areas. Figure 5 is a representation of Simpson's best estimate of the distribution and extent of the RCRs. The total acreage estimate for the RCR was derived from several planning processes that Simpson has conducted including internal basin planning, planning associated with the Washington State Shorelines of Statewide Significance, Watershed Analysis, and resource planning associated with this HCP. These planning efforts required aerial photo interpretation, zone width application through Simpson's GIS, and field verification of select areas. Simpson will track the actual "as cut" RCR acreage and will report those figures by timber harvest unit and LTU in annual Implementation Monitoring reports (see Section 8). Manipulation of stands (thinning) will not occur in 70 percent of the RCR (20,197 acres), and selective timber management could occur within the remaining 30 percent (8,795 acres) of the RCR subject to constraints identified below (Table 6, footnote 14).

Table 6. Estimates of different types of conservation lands within the Plan Area.

Conservation Area Category	Acres	Percent of Plan Area
RCRs		
Riverine RCRs (includes unstable slopes within the functional riparian boundaries)		
Continuous no harvest riverine RCR	10,446	4.0
Continuous thinned riverine RCR	6,160[12]	2.4
Discontinuous riverine RCR	1,417	0.5
Other		
Delivering unstable slopes, outside but contiguous with, functional riparian boundaries	6,915	2.6
Wetland RCRs		
No harvest wetland RCR	1,419	0.5
Thinned wetland RCR	2,635	1.0
RCR Sub-total	***28,992***	***11.1***
WETLANDS		
Non-forested wetlands	6,059	2.3
Forested wetlands (one half of these acres will be conserved)	3,724	1.4
Riverine channel bed	2,572	1.0
Wetland Sub-total	***12,355***	***4.7***
Total Conservation Area Acres	***41,347***	***15.8***

[12] Simpson has evaluated the operational feasibility of managing these RCR acres and estimates that only 3,800 acres are actually manageable. The net effect of this constraint is likely to reduce the managed treatment of the RCR to about 6,400 acres or approximately 22% of the total. The amount of managed RCR will be part of the annual RCR implementation monitoring report (Section 8).

One of the primary wildlife habitat management goals of this HCP is to conserve and develop mature and late-seral forests, which can be used as core areas for various wildlife species. This goal will be achieved by implementing the riparian conservation reserve strategy, including areas identified as Late-seral Forest Reserves (LFR). These conservation actions will maintain existing mature forests (50-100 years-old) and old-age forests (more than 100 years-old) in these areas, and enhance the availability of old-age forest habitat by allowing other forests to grow to old-age. The LFRs will be connected to adjoining forests conserved in the RCR network, and younger forests (30-50 years old) also will be dispersed in surrounding timber management areas.

Nine LFRs have been identified due to their relatively large contiguous size and mature forest conditions. These LFRs range in size from 263 acres to 1,234 acres, with an average of 713 acres. These areas are named according to their respective river drainages, as listed in (Table 7) and shown in (Figure 8). The vegetation composition in these areas was determined from aerial photos; forest ages were estimated from timber inventory data and site assessments (Table 7).

Overall, a majority of these LFRs currently have mature (50+ years old) hardwood forest, with a lower percentage of coniferous forest. However, the largest LFR (1,234 acres) consists of 51 percent coniferous forest, of which 69 percent is at least 50 years old. Additionally, six of the nine LFRs have at least 30 percent coniferous forest 30-50 years old (Table 7). Small (2 to 60 acre) patches of old-age (more than 100 years-old) and old-growth (120+ years- old) coniferous forest also exist in some of these areas. Many of those old-growth stands have been identified as marbled murrelet habitat, as shown in Figure 8.

Table 7. Late-seral Forest Reserves (LFR) proposed for the Simpson Timber Company HCP area.

Late-seral Forest (LFR) Area	Acres	Non-For.	Con. For.	Portion of coniferous forest		Dec. For.	Portion of deciduous forest	
				Over 50 yrs old	Over 70 yrs old		Over 50 yrs old	Over 70 yrs old
Wynoochee 1	346	14%	43%	38%	17%	43%	21%	17%
Wynoochee 2	747	25%	22%	6%	0%	53%	34%	16%
WF Satsop 1	406	11%	17%	3%	2%	72%	59%	41%
WF Satsop 2	805	1%	25%	15%	3%	74%	74%	52%
Canyon River	1216	0%	30%	15%	9%	70%	61%	49%
MF Satsop	1003	1%	30%	12%	8%	69%	69%	67%
Vance Creek	263	16%	49%	22%	0%	35%	27%	0%
SF Skokomish	395	29%	32%	25%	13%	39%	37%	17%
NF Skokomish	1,234	1%	51%	69%	6%	48%	96%	20%
Overall	**6,415**							

Non-commercial forest includes: brush, barren, wetlands, and open water.
Coniferous forests are those forests with more than 50% coniferous trees in the overstory.
Deciduous forests are those forests with more than 50% deciduous trees in the overstory.

6.2.1.2 RCR Boundaries

Outer boundaries of the RCR are determined in two ways; by *functional* widths as designated in Table 26 of Appendix B or by the extent of adjacent *unstable* slopes as determined through provisions in Section 5.2.5, whichever is greater. The establishment of this kind of integrated riparian reserve is expected to maintain recruitment of logs to the channel network at full landscape potential.

6.2.1.2.1 Riparian functional boundaries

Simpson's riparian conservation prescriptions differ from other traditional approaches that use the ordinary high water mark ("OHW") as the benchmark for measurement of riparian buffer width. HCP riparian reserve widths have been designated by channel class (Table 25, Appendix B). These widths were determined by identifying the primary zones adjacent to each channel class where the functional interactions with the riparian forest are most pronounced. These primary interaction zones are given full no-harvest protection. For example, the highly to moderately confined channels of the AGL tend to recruit the vast proportion of their "on site" woody debris and derive their shade from trees and underbrush growing on discontinuous terrace surfaces and the adjacent incised side slopes comprising the confining valley walls. Consequently both the channel migration zone and side slope surfaces are accorded full no-harvest protection by the "Break in Slope" riparian strategy (see Appendix B, channel classes AGL-Qo3, 5, 6, and 7). The widths of these zones are actually measured from the break in slope.

This method of measurement includes substantial area, with the most valuable trees for the stream and comprising the most critical functional zones and sets aside these areas as riparian preserves. These areas *are transparent in the designated widths* in Table 26, Appendix B (i.e. the horizontal width of the valley floor and the side slopes does not show up in the width of the riparian area when it is measured from the "break in slope"). Figure 10 depicts a hypothetical valley cross section illustrating the three topographic breaks that are utilized in Simpson's system. In only a single case of the 49 channel classes, distributary segments of alluvial fans (ROP-C7), is the OHW used. In this case the edge of the OHW in the outermost segments on each side of the fan are used.

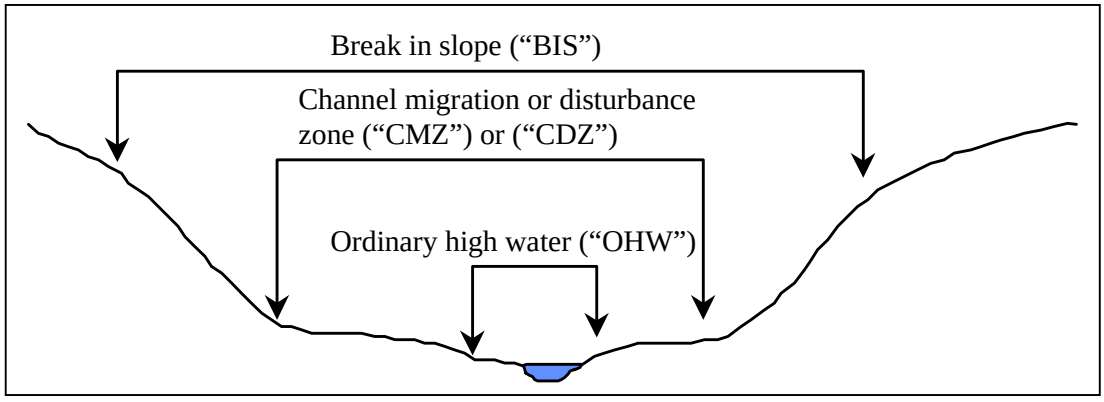

Figure 10. Hypothetical valley cross section showing the various topographic breaks and surfaces that serve as measurement benchmarks in Simpson's riparian approach.

6.2.1.2.2 Unstable slope boundaries

The RCRs are defined not only by the functional boundaries for each channel class but also by the extent of unstable, delivering side slopes. *In many cases the delineation of unstable slopes*

describes a more extensive riparian leave area than would be derived by simply implementing the prescriptions contained in Appendix B. The recognition of the role unstable slopes play in delivering woody debris and coarse sediment to many channel classes in the Plan Area is considered pivotal in the riparian strategies. The several large irregular leave areas adjacent to the main north-south trending river valleys are good examples of how unstable slopes affect the delineation of the RCR (Figure 5). To a lesser degree throughout the Plan Area, unstable slopes adjacent to many different channel classes add substantial edge irregularity and increase the number of leave trees in the RCR through application of prescriptions for unstable slopes.

6.2.1.2.3 Recruitment of logs and woody debris

In considering how to maintain adequate wood loading in the channel network, Simpson has carefully evaluated how log recruitment processes vary in each LTU and what the dominant recruitment mechanism is for each channel class. This was a critical step in the development of the RCR boundaries, both the functional boundaries (Table 26 and Table 27,) and the unstable slope boundaries (Section 5.2.5) as well as for the narrative descriptions for each riparian strategy in Appendix B. In general, the principal recruitment processes for logs are: mass wasting, bank erosion, (including channel avulsions on large meandering systems) and windthrow. To a much lesser degree, suppression and natural death of trees through vegetative succession is an additional process, but the recruitment of those trees is normally triggered by wind (although they sometimes may fall due to lack of structural support entirely unaided by the wind). Considered together, this last process is the least important of the four in supplying wood to channels of the Plan Area.

Simpson's strategy of riparian and stream management focuses on setting the landscape up for productive development when natural disturbances occur. It is just these disturbances in fact that Simpson's riparian strategies anticipate. For example, it is expected that 100% of all the possible logs that might recruit to the channel network owing to floods and erosion of lands within the channel migration zone will occur under HCP management because all those lands are given 100% protection. The same holds true for recruitment from mass wasting. Since all of the delivering unstable slopes are protected from harvest, the full potential for supplying logs will be preserved. In the case of windthrow, Simpson has modeled its riparian prescriptions after the conclusions reached from analyses graphically represented in Figure 17, Appendix E. It is expected that approximately 75% of the log recruitment (based on a conservative definition) due to windthrow will be realized. In actuality this figure will be much higher because it will include a higher per piece wood volume from trees close to the stream. The further away trees are from the stream, the lower per piece volume they contribute owing to taper in the bole of the tree.

These different recruitment processes do not affect all channel classes equally. However, in the development of its riparian strategies, Simpson has endeavored to capture the most important or dominant process for each channel class. Therefore it is expected that somewhere between 75 and 100% of the potential log recruitment will be preserved by HCP management for all channel classes. Due to the highly variable nature of wood loading in streams, even under unmanaged conditions, for all channel classes, this level of wood loading will be virtually non-detectable from 100% of the landscape and channel segment potential. This is not to say however, that all riparian lands of the Plan Area today are immediately capable of supplying the number and character of logs that represent the landscape and channel segment potential, as many of these trees were removed during previous harvest. The landscape is now in various stages of forest succession and stand age and HCP management will preserve these stands promoting their development for present and future functional contributions to riparian and stream ecosystems.

6.2.1.3 Forest Stand Types

Vegetation cover types and age classes within the RCR were determined by delineating the proposed RCR boundaries (as defined in previous sections and shown in Figure 5) on aerial photos and then determining vegetation types in those areas. Current vegetation conditions could not be determined in the case of those segments receiving discontinuous buffers because those segments will not be identified for certain until timber harvest unit layout. However, Simpson does know that a vast majority of those forests, in the smaller headwater stream areas, where the majority of the discontinuous buffers would occur, are coniferous. Additionally, these areas make up about 15 percent of the total RCR, therefore, the percentage of cover types determined for known RCR areas were used to approximate the entire RCR network. The results of this assessment (Table 8) show that approximately 79 percent of the Plan Area conservation lands are forest, and 21 percent is non-forest. "Non-forest" includes shrublands, non-forested floodplains, open water and non-forested wetlands. Of the conservation lands approximately 49 percent and 30 percent are coniferous and hardwood forest, respectively.

Table 8. RCR forest cover type by LTU.

LTU	Acres	Percent Total	Percent Coniferous	Percent Deciduous	Percent Non-forest
AGL	4,395	10.6	29	51	20
CIS	2,247	5.4	35	53	12
CUP	5,169	12.5	86	11	3
ROP	13,083	31.7	43	13	44
SIG	16,453	39.8	51	39	10
Total	***41,347***	***100.0***	***49***	***30***	***21***

Figure 11 shows the percent of forest cover types in the RCR, by age, as anticipated for each cover type in plan years 1, 25 and 50. Current conditions of forests and species dominance were compared with expected natural successional trends to derive estimates of expected forest plant community in the RCR. Based on these initial general estimates, at least 20 percent of the stands currently dominated by hardwoods are expected to convert to mixed conifer and hardwood stands or stands dominated by conifers by year 25 and a total of 35 percent of the original hardwood stands will likely convert to stands dominated by coniferous trees by year 50. The natural succession and conversion of hardwood stands to conifer dominated stands is considered important to the long term recruitment of woody debris and natural functioning of Plan Area streams and will be a subject of the Monitoring Program (Section 9) and Experimental Management (Section 5.2.8). Figure 11 does not represent these anticipated successional changes.

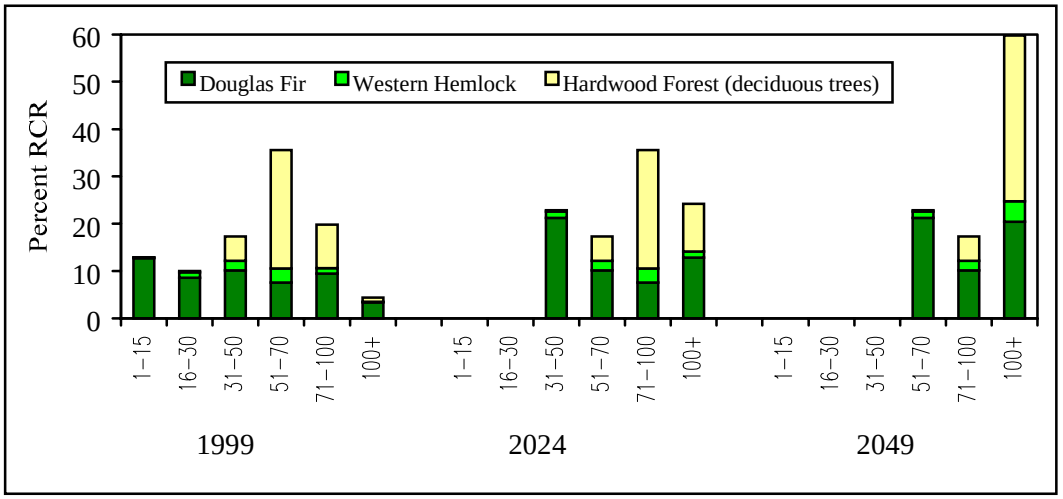

Figure 11. Percent of forest cover types in RCR by age, for beginning, middle and end points of the plan period.
Some stands of the younger age classes (absent from Years 2024 and 2049 in Figure 11) most likely will be present in the RCR during the plan period as a result of natural regeneration after natural disturbances. It is difficult to predict the acreage of those stands with the data and growth models used for this analysis, but it is expected that this acreage will be less than 5 percent of the total RCR.

6.2.1.4 Overall Number and Size of Leave Trees

Currently 22,397 acres of the RCR have stands of timber greater than 30 years old with an average diameter breast height ("DBH") of greater than 8 inches. These stands average 175 trees per acre. Therefore, Simpson estimates that currently there are more than 3.9 million trees in the 30+ year age class in the RCR. On a Plan Area-wide basis, this number of trees is equivalent to an average of 15 trees per acre across the Plan Area. Although these leave trees are not evenly distributed across the landscape, the RCR does provide a wide network of leave trees and conservation zones throughout most of the HCP area (Figure 5). This distribution is considered to be favorable for many wildlife species due to the high density and wide distribution of these trees across the HCP landscape.

Of the remaining portion of the RCR, 2,875 acres currently consist of stands of less than 30 years in age, but which are expected to be greater than 30 years old by year 25 of the plan (e.g. 2024). This additional acreage of forest will provide at least 500,000 additional conservation trees in the RCR greater than 30 years old at least by Year 25. The remaining 3.720 acres in the RCR most likely will not support stands with timber older than 30 years at mid-plan period due to particularly young age at the date of plan initiation. Many of these remaining acres are currently dominated by shrubs.

Some trees currently in the RCR will be lost through future natural disturbances, such as wind storms and floods, however other trees will establish and grow to maturity. Given these assumptions, and barring a major as yet unprecedented catastrophic event, and taking into account the limited harvest permitted in the RCR under this plan, the average number of leave

trees is expected to remain relatively stable throughout the life of the plan subject only to natural successional changes.

Table 9 shows the average DBH of trees in the six age classes defined for the HCP area. The table also shows the average DBH of the 40 largest trees (dominant and co-dominant canopy layers) within each stand, which are typical of the dominant and co-dominant canopy layers for each age class. Given these size class estimates in Table 9 and also the age class distributions shown in Figure 11, one can conservatively conclude that a majority of 3.9 million trees in the RCR at Year 1 will be at least 30-50 years old, with an average DBH of at least 13-16 inches (Table 9). During years 25 through 50 of the plan a majority of the trees in the RCR will be at least 50 years of age with average DBH between 15 to 20 inches (Table 9).

Table 9. Approximate average tree diameter at breast height for six age classes in the Simpson HCP area.

Forest Age Class	Data Source	Average DBH of All Trees > 4 inches DBH		Est. Average DBH of Dominant/Co-dominant (40 largest trees/acre)	
		Coniferous	Deciduous	Coniferous	Deciduous
1-15	Survival Surveys	3.0	1.5	4.0	3.0
16-30	Survival Surveys	6.0	5.0	8.0	7.0
31-50	Forest Inventories	13.0	14.0	16.0	14.0
51-70	Forest Inventories	15.5	14.4	20.0	14.4+
71-100	Forest Inventories	14.7	14.0+	28.0	14.0+
100+	Forest Inventories	15.4	14.0+	32.0	14.0+

Coniferous tree DBH data is limited to Douglas fir species.
Deciduous trees greater than 70 years old are predominantly big leaf maple and cottonwood.

Corroborative evidence for the size of Douglas fir in the RCR (Douglas fir constitute 23% of all trees in the RCR) comes from riparian monitoring done by Simpson (Appendix E). The average size Douglas fir is currently 42 cm (17 inches) with good representation of larger individuals that are now even capable of playing key member roles in streams as they are recruited.

6.2.1.5 Stand Characteristics by Channel Class

Simpson's riparian strategy is difficult to compare to more traditional approaches that define riparian areas based on measurement of a regular distance from the OHW mark. Since Simpson's measurement point is either the CMZ, CDZ or the BIS, many acres of riparian and valley wall land are transparent in the width measurements in Table 26, Appendix B. Consequently it is difficult to evaluate strategies in the more traditional ways (i.e. leave trees per unit length of stream) and to assist reviewers in this regard tree density and basal area for the stands retained by the prescriptions are presented in Table 10. Information from 30 riparian monitoring sites and upslope forest inventory from the Plan Area were used in this analysis. Since detailed cover typing by channel class is incomplete at this time it was necessary to establish typical densities that are referred to as wet or dry sites and apply them appropriately to each channel class. The principal difference between wet and dry sites is that wet sites have a greater proportion of hardwoods growing on the CMZ/CDZ and slope surfaces than dry sites. Densities and basal area for hardwood and conifer were developed for the 3 surfaces, terrace or CMZ/CDZ, slope and upslope and then applied to the leave acreage on one side per 1,000 feet of channel. The density and basal area was appropriately reduced for channel classes that have some portion of their leave areas managed.

It is important to note however, that any conclusions reached from these kinds of data must be viewed in an operational context. Clearly there is a continuum of riparian conditions today (for any particular channel class), that is the result of logging operations and silvicultural practices over the last century, which in the last two decades have featured increasing levels of riparian protection and stand management. Without this recognition any description of riparian conditions may be misleading. Current riparian conditions are the product of natural site potential and stand history, including harvest and silvicultural practices. In general, riparian stand history may be described by three harvest and silvicultural histories: 1) naturally regenerated second growth stands of harvestable age today that grew back following harvest of old growth in the early part of this century, 2) plantation forests that were planted after complete harvest of the old growth, 3) combined plantation forests and relatively narrow bands of naturally regenerated second growth next to the stream (increasingly wider zones with more trees since 1986).

Table 10 presents the conditions generally found today adjacent to channel segments that are bordered by harvestable age naturally regenerated second growth stands (Riparian History 1 above). These data represent typical riparian conditions that will be retained during harvest of mature timber in the first half of the plan period. Segments of channels running through stands that were harvested previous to 1986 are best represented by inventory data from young growth stands and for which no data is presented. In many cases these segments were harvested at a time when no riparian buffers or only minimal non-merchantable buffers were retained, resulting in a riparian potential quite different from stand history 1 described in the previous paragraph. In these cases the majority of trees that will be retained during harvest, which will occur in the last half of the plan period, will be trees that were planted as part of plantation reforestation. In most cases these stands are typified by relatively high density, thrifty Douglas fir stands with lesser components of naturally regenerated hemlock, western redcedar, and alder with occasional residual older trees from the previous stand. Prior to controls on the use of herbicides around water, hardwoods were suppressed chemically in many riparian areas resulting in fast growing conifer stands that will have some of the highest basal area values of riparian reserves in the future.

Simpson is currently supporting studies to describe the natural plant potential of riparian settings in each lithotopo unit by channel class (Peter and Henderson 1999). This information will be useful to refine expectations regarding potential wood loading of channels and help in evaluating riparian and in-channel monitoring data. It may also be invaluable in guiding decisions about future adjustments to management prescriptions pursuant to Section 10.

6.2.2 Explanation of the Supplemental Wildlife Tree Conservation Program

Simpson will conserve a minimum average of 8 trees per acre, at least 10 inches DBH, for each section in the Plan Area. Figure 6 shows the average leave tree density by 10 acre grids and those sections of land where the 8 trees per acre threshold is not met (total 46,612 acres). In these areas special tree conservation management that will ensure the criteria will be met. In many of those cases the criteria will be met by conserving forested wetlands, pursuant to Section 5.2.3.

In addition to the above criteria, Simpson also will voluntarily leave some individual trees or small clumps of trees outside the RCR during harvesting operations. These trees will supplement those that would be present during the course of day-to-day management of 50-year old stand rotations. Conservation of these trees is voluntary because they can not be quantified until after timber harvest is conducted within each timber harvest unit. At this time there are no provisions to include these voluntary trees as mitigation credit, because they can not be quantified. However, this practice currently occurs and will continue to occur and Simpson may at some future date wish to quantify these conservation actions for possible mitigation credit.

Table 10. Estimate of conifer and hardwood trees and basal area per 1,000 feet of channel (one-sided) that will be retained by riparian prescriptions.
Data apply to fish-bearing segments for each channel class and have a conservative bias due to additional leave area required by unstable slopes and other sensitive site requirements that are unaccounted in this "uniform" zone analysis.

		TPMft.	TPMft.	TPMft.	BAPMft.	BAPMft.	BAPMft.
LTU	**CLASS**	**Conifer**	**Hardwood**	**Total**	**Conifer**	**Hardwood**	**Total**
AGL	QA6	328	456	784	487	374	861
	QO1	175	111	286	253	91	344
	QO2	180	137	317	261	112	373
	QO3	202	84	286	298	68	366
	QO4	200	178	379	290	146	436
	QO5	212	154	366	307	126	433
	QO6	234	98	332	348	79	427
	QO7	259	120	379	382	97	479
	QO8	357	208	565	521	169	691
CIS	C1	166	106	272	225	97	322
	C5	272	176	448	371	163	535
	QC1	167	114	282	228	103	331
	QC2	172	138	311	236	123	359
	QC3	215	172	388	296	154	450
CUP	C1	214	65	279	309	59	367
	C2	266	85	351	385	76	461
	C3	266	85	351	385	76	461
	C4	266	85	351	385	76	461
	C5	202	111	312	294	96	390
	C6	320	98	418	461	87	548
	C8	458	120	578	658	108	766
ROP	C7	411	113	525	505	105	610
	QA7	577	403	980	720	391	1112
	QC1	229	71	300	293	61	355
	QC2[13]	82	34	116	110	32	142
	QC3	282	109	392	369	94	463
	QC4	239	59	298	289	55	344
	QC5	390	105	495	484	97	581
	QC6	407	149	556	478	124	602
	QC7	559	313	872	721	264	984
	QC8	567	241	808	699	203	902
SIG	L1	141	115	256	234	97	330
	L2	204	289	493	338	240	578
	L3	156	123	279	271	104	375
	L4	655	746	1401	1036	621	1657
	M1	141	115	256	234	97	330
	M2	152	171	322	252	142	394
	M3	203	171	374	353	144	497
	M4	304	261	564	524	220	744
	M5	637	714	1351	984	594	1578
	M6	299	462	761	489	383	872
	QA6	309	513	822	506	425	930
	QC1	142	123	265	236	103	339
	QC2	144	131	275	239	110	349
	QC3	138	165	303	224	137	362
	QO1	142	123	265	236	103	339
	QO2	149	155	303	247	129	376
	QO3	150	105	256	272	90	362
	QO4	238	180	418	425	153	577

[13] Numbers for this channel class are conservative because they represent the smallest members of this channel class (typically found in the southern portions of the ROP – see Appendix D)

The advantage to leaving some wildlife trees scattered across the landscape is that it will: 1) retain some mature tree habitat on the landscape (outside the RCR) when stands are harvested and the regenerating stands are young (e.g. less than 35 years old); 2) these trees provide habitat for a variety of passerine species (e.g. western bluebird) that perch and nest in trees with low stem densities; and 3) these trees provide habitats for other wildlife species across the landscape. These voluntary conservation trees typically will be retained within or adjacent to timber harvest units and consist of trees that: 1) have little merchantable value; 2) do not present a safety liability; and 3) can be left without significantly restricting harvesting or yarding operations. The number of wildlife trees left standing and their location on the landscape will be determined on a case-by-case basis for each particular timber harvest unit.

6.2.3 Explanation of the Wetlands Conservation Program

Wetlands provide many important functions including: fish and wildlife habitat, groundwater discharge, base flow support in streams, flood control, and water quality improvement. The Plan Area has a variety of wetland types ranging from sag ponds on ancient deep seated landslides in the SIG, sphagnum bogs in the ROP, to riverine off-channel systems on the Wynoochee River floodplain in the AGL.

The National Wetlands Inventory ("NWI") and Simpson's own basin planning efforts document a total of 6,059 acres of non-forested wetlands and an additional 3,724 acres of forested wetlands in the Plan Area (Table 6). Inventory and classification of wetlands during Plan implementation will refine Simpson's estimates of the number of acres by wetland and conservation area type (Section 5.2.3.1). The Stillwater River area of the ROP has an unusually high density of wetlands with numerous small channels connecting wetland features and the stream system. Although this area only encompasses about 5 percent of the Plan Area, it has about 20 and 31 percent of the non-forested and forested wetlands respectively.

The wetland management prescriptions combine an advanced classification system (as it is being applied to forest practice regulation) with a solid approach to functional protection. Simpson's Wetland Conservation Program will be complemented by an assessment and monitoring approach to wetland function that will be stratified by wetland class and sub-class (Table 4). Road management around wetlands in the Plan Area will emphasize the minimization of sediment delivery to wetlands and the maintenance of natural flow patterns, which should stabilize water levels. In addition, the occurrence and spread of exotic plants will be monitored. Simpson's wetland prescriptions will both protect water quality and hydrologic integrity of its wetlands, as well as further the development of riparian forests with late-seral conditions.

Riparian habitats, adjacent to wetlands and riverine systems, provide some of the greatest wildlife habitat diversity that exists in the Plan Area. Current forest practice rules require a certain level of protection for wetland riparian habitats, and this HCP provides significantly higher standards of protection beyond those thresholds. At least 50 percent of the forested wetland stem density, currently present, will be conserved during the HCP period. This conservation measure, along with the wider wetland management zones, will help sustain wildlife species populations that rely on riparian habitats for a majority of their life history requirements.

One group of wildlife species that will especially benefit from these HCP wetland conservation measures are the cavity nesting ducks. Cavity nesting ducks (common merganser and wood duck) all require nesting cavities in trees between 17 and 25 inches DBH that are within close proximity to open water wetlands, and some types of major rivers. The conservation measures proposed here will not only conserve those types of habitat that are already present but they also will promote the future development and conservation of such habitat during the Plan period.

For the aquatic species, the lentic association will be the primary beneficiary of the wetlands prescriptions (Table 12). The wetland buffers will provide complex shoreline and riparian habitat, which will benefit commonly occurring amphibians of the ROP (Northwestern and long-toed salamanders and red-legged frog). Improved water quality and stability of the water level during the early spring breeding period will also benefit amphibians, such as the Northwestern salamander that attach egg masses to twigs and debris and require relatively stable water stages for successful larval development. Improved water quality and structural diversity of near shore habitat will benefit pond dwelling fish species such as the prickly sculpin, three-spine stickleback and the Olympic mudminnow. Over wintering habitat for juvenile coho and rearing habitat for cutthroat trout (species that also use lentic habitats) will be improved.

6.2.4 Explanation of the Road Management Program

Logging roads are an essential part of any intensively managed forest landscape and are needed for the efficient extraction of timber resources. Simpson has 1,996 total active road miles in the Plan Area (Table 13) which traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area today is 4.9 miles per square mile varying between 7.1 in the CIS to 4.1 in the AGL (Table 13).

Table 11. Road mileage by LTU and road type in the Plan Area.

	Lithotopo Unit					
Road Type	**AGL**	**CIS**	**CUP**	**ROP**	**SIG**	**Total**
Abandoned	2.3	4.3	20.3	8.9	11.9	47.8
System	76.2	203.8	143.5	457.0	305.2	1185.8
Spur	65.4	138.1	35.6	399.0	172.0	810.1
Current total	**143.9**	**346.2**	**199.4**	**864.9**	**489.1**	**2043.7**

The Plan Area is not fully roaded, but at this time Simpson is unable to accurately project the number of new roads that will be needed to access certain portions of the Plan Area. On average, it is anticipated that road density will not exceed 6.0 miles per square mile at any time during the plan period.

Logging road construction standards have evolved over the last several decades, and like other private forestland owners, Simpson has roads with a wide range of design standards. A major part of the challenge in reducing the effects of the road system on aquatic resources is to address so-called legacy roads. Legacy roads are those which were built prior to 1974 and constructed to lesser design standards than current roads, and which are generally not used for active haul routes today. Some of these roads are inaccessible, extending well beyond fill failures. Simpson currently has no obligation under state or federal law to treat existing legacy roads. However, as an element of the mitigation to be provided under this plan, Simpson will address many of its legacy roads on a segment-by-segment basis during the road inventory and remediation process described in the prescriptions (Section 5.2.4.1).

Table 12. Linkages between aquatic species, their habitats, riparian strategies, management prescriptions and expected benefits.

Aquatic Species Associations	[1]Distribution by LTU (Primary)	Distribution by Channel Class (Primary)	Functional Habitat Elements	Aquatic Resource Objectives[2] Particularly Important to Species Association	Applicable Riparian Strategies	Management Prescriptions Delivering the Most Benefits	Expected Benefits
Headwater RHOL ASTR DICO PLVA	CUP SIG AGL	CUP-C1, C2, C3 SIG-Qo1 AGL-Qo1	Loose alluvial cover in steep headwater streams, streamside seeps, woody debris, cool water.	Area wide No. 1, 2, and 3 CUP - No. 7 and 8 SIG - No. 13 (Qo1) AGL - No. 1	Canyon Unstable /Intermittent	Riparian reserves; 5.2.1 (a), (b), (c) Road remediation 5.2.4.2 (b), (c), (d), (e) Road maintenance 5.2.4.3 (all) Road use 5.2.4.4 (a), (b) Road design 5.2.4.5 (a), (b), (c) Unstable slopes; 5.2.5 (a), (d) Hydrologic maturity; 5.2.6	Streamside seeps will be protected (RHOL), riparian habitat sufficient to supply woody debris for the maintenance of alluvial cover in steep channels will be protected and developed (RHOL, DICO, ASTR), detrital sources for support of lower trophic levels will be maintained (DICO), shade sufficient to maintain cool water temperatures will be retained (RHOL, ASTR), the incidence of road related debris flows will be reduced, management related landslides will be virtually eliminated, and the storm water runoff pathways of small streams and basin hydrology will be maintained in a relatively natural state (RHOL, DICO, ASTR).
Steep Tributary ONCL COCO PLVE	AGL CUP	AGL-Qo1 CUP-C2, 3, 4	Alluvial cover in steep headwater streams, woody debris, diverse channel bed topography including pools, cool water, structurally diverse riparian forests.	Area wide No. 1, 2, and 3 AGL - No. 1 CUP - No. 7 and 8	Unstable /Intermittent Canyon	Riparian reserves; 5.2.1, (a), (b) Road remediation 5.2.4.2 (b), (c), (d), (e) Road maintenance 5.2.4.3 (all) Road use 5.2.4.4 (a), (b) Road design 5.2.4.5 (a), (b), (c) Unstable slopes; 5.2.5 (a), (d) Hydrologic maturity; 5.2.6	Scour caused by debris flows initiated by failures occurring in the headwater first and second order channels will be reduced (ONCL, COCO), diverse channel bed topography will be maintained and developed through the recruitment of large logs (ONCL, COCO), quality of breeding habitat for sculpins under cobbles and boulders will be maintained (COCO), patches of pebbles for cutthroat spawning will be preserved behind obstructions (ONCL), shade will be maintained through a diverse riparian vegetation (ONCL, COCO), when naturally unstable side slopes fail they will bring with them a legacy of large woody debris for habitat development (ONCL, COCO), micro-climate of riparian areas and stream side seeps will be protected (PLVA).
Flat Tributary ONKI ONKE COGU COAL COPE RHOS LARI	ROP AGL CIS SIG	ROP-Qc2, Qc3, Qc4, Qc5, Qc6 AGL-Qo4, Qo5, Qo6, Qo7 CIS-Qc2, Qc3 SIG-Qa6, Qo2, L2, M2, M3, M4, M6	Pool habitat, woody debris cover, stable spawning gravels, cool water, structurally diverse riparian forests.	Area wide No. 1, 3, and 4 ROP - No. 9 and 10 CIS - No. 4, 5, and 6 CUP - No. 7 SIG - No. 12 AGL - No. 2 and 3	Temperature Sensitive Break in Slope Channel Migration Alluvial/Bedrock Reverse Break in Slope	Riparian reserves; 5.2.1, (a), (b) Road remediation 5.2.4.2 (b), (c), (d), (e) Road maintenance 5.2.4.3 (all) Road use 5.2.4.4 (a), (b) Road design 5.2.4.5 (a), (b), (c) Unstable slopes; 5.2.5 (a), (d) Experimental mitigation 5.2.7 (a), (b)	Sediment supply from the upper watersheds will be reduced which will improve pool habitat over the long term (ONKI, RHOS), stabilize spawning gravels and prevent streambed scour (ONKE), this same reduction in coarse and fine sediment over time will result in gravels with a smaller fraction of fine particles which will improve survival to emergence of large bodied salmonids (ONKI, ONKE), interstitial breeding habitat for sculpins will be maintained and improved with a lower sediment supply (COGU, COPE, COAL), woody debris recruitment will be maintained and increased over time promoting development of structurally diverse and complex stream habitat with low pool spacing in moderate to low gradient plane bed/ forced pool riffle channel types (ONKI, COGU, COPE, COAL, LARI), shade will be sufficient to prevent elevated temperatures due to canopy loss (ONKI).
Mainstem ONTS ONMY ONGO SACO SAMA CORO RHCA LATR LAAY BUBO	AGL SIG ROP	AGL-Qa6, Qo8 SIG-Qa6, L4, L5 ROP-Qc7, Qc8	Stable spawning gravels, adult holding pools, complex floodplain and off-channel habitat, complex edge habitat, large woody debris complexes.	Area wide No. 1 and 3 SIG No. 14 CUP- No. 7	Channel Migration Inner Gorge	Riparian reserves; 5.2.1, (a) and (b) Road remediation 5.2.4.2 (b), (c), (d), (e) Road maintenance 5.2.4.3 (all) Road use 5.2.4.4 (a), (b) Road design 5.2.4.5 (a), (b), (c) Unstable slopes; 5.2.5 (a), (d)	Large logs will be recruited from streamside riparian forests promoting complex edge habitat (ONMY, BUBO), diverse floodplain and lower terrace riparian habitat will be preserved (BUBO), sediment and organic retention functions and hyporheic functions will be maintained, diverse streambed topography will be maintained including rearing habitat for juvenile salmonids and other non-salmonid fishes (CORO, RHCA) and deep resting pools for adult steelhead and salmon (ONMY, ONTS, SACO, SAMA), inner gorge surfaces will not be destabilized through management activities, overall sediment bedload to the main rivers will be reduced from the tributary network stabilizing spawning habitat over time (ONTS, ONMY, ONGO, LATR, LAAY).
Lentic COAS NOHU GAAC AMGR AMMA RAAU	ROP	Various wetlands types[3]	Structurally diverse riparian forests, structurally complex wetland habitat, good water quality.	Area wide No. 1 and 3 ROP - No. 11	Wetlands	Wetland inventory 5.2.3.1 Wetland protection; 5.2.3.2 Road remediation 5.2.4.2 (b), (c), (d), (e) Road maintenance 5.2.4.3 (all) Road use 5.2.4.4 (a), (b) Road design 5.2.4.5 (a), (c)	Wetland water levels will not be altered through piracy or addition of water through ditches, stabilizing littoral habitat for pond breeding amphibians and fishes, water quality will be improved by reducing road surface erosion, invasive plant species will be monitored, riparian forests will be protected and developed, significant forested wetland acreage will be maintained (NOHU, GAAC, AMGR, AMMA, RAAU).

RHOL: Olympic torrent salamander; ASTR: Tailed frog; DICO: Cope's giant salamander; PLVE: Western redback salamander; ONCL: Cutthroat trout; COCO: Shorthead sculpin; PLVA: Van Dyke's salamander; ONKI: Coho salmon; ONKE: Chum salmon; COGU: Riffle sculpin; COAL Coast Range sculpin; COPE Reticulate sculpin; RHOS Speckled dace; LARI: Brook lamprey; ONTS: Chinook salmon; ONMY: Steelhead trout; ONGO: Pink salmon; SACO: Bull trout; SAMA: Dolly varden; CORO: Torrent sculpin; RHCA: Longnose dace; LATR: Pacific lamprey; LAAY: River lamprey; BUBO: Western toad; COAS: Prickly sculpin; NOHU: Olympic mudminnow; GAAC: Three-spine stickleback; AMGR: Northwestern salamander; AMMA: Long-toed salamander; RAAU: Red-legged frog

[1] Not an exhaustive description of species distribution but constitutes the principal LTUs and channel classes where the species occur within the Plan Area.
[2] Refer to Section 6.1 for explanations.
[3] See Section 5.2.3 Table 4 for explanation.

Table 13. Current active system and spur road miles in the Plan Area and associated road densities

LTU	Current Miles	Road Density
AGL	141.6	4.1
CIS	341.9	7.1
CUP	179.1	4.1
ROP	856.1	4.7
SIG	477.2	7.8
Total	**1,995.9**	**4.9**

Implementation of the road management prescriptions will reduce chronic fine sedimentation of streams and the catastrophic failure of road fills and sidecast that generate and propagate hillslope and channel failures. These improvements are anticipated to be the direct outcomes of the road prescriptions and should result in more stable habitat and supplement the ecological benefits derived through heightened riparian forest function (Section 5.2.1). Less coarse sediment will be transported to fish bearing portions of the channel network and consequently more pool habitat of a better quality will be maintained. In the non-fish bearing segments of the channel network, woody debris structures and alluvial cover of the bedrock will be maintained, without which the stream breeding amphibians have little rearing and breeding substrate.

6.2.4.1 Road Inventory

The primary benefit from the road inventory program will be a systematic examination of the entire road system. This process will generate information about road segments and channel crossings that need remedial maintenance work or complete decommissioning. A framework will be constructed for the overall assessment of the impacts of the road system. As a result of this work, road problems that would otherwise have impacted aquatic resources of especially high value or having other unique values, will be fixed.

6.2.4.2 Road Remediation

Through the road inventory process, Simpson will identify a permanent road system, which is necessary for forestry operations. Roads that will be candidates for decommissioning are: 1) those not needed for current and anticipated future operations, 2) roads that have a high risk of failure and/or delivery of sediment to streams, and 3) roads located in riparian areas.

Simpson has three years of experience decommissioning roads and has finished 20 miles in the CUP since 1995. Road decommissioning work is expensive but once completed, returns the land to natural hydrologic and hill slope function. Simpson expects to continue road decommissioning as an ongoing aspect of its road management program subject only to the limitation of resource commitments identified in the Section 5.2.4.2. These limitations are considered to be sufficient based on the following assessment. Assuming 10% of the road system or about 200 miles of road need significant remediation (at a cost of about $16,000 per mile), the worst of the road problems could be handled within 6-7 years under the financial caps. Costs per mile vary but Simpson has been able to entirely decommission roads in the CUP for this figure. Simpson will also seek outside cost-sharing for this aspect of its road management program to accelerate the scope and benefit of the work. For example, Simpson is currently engaged in road decommissioning in the Skokomish River watershed in a working partnership with the USDA Forest Service and US Fish and Wildlife Service. Simpson's road decommissioning project is pioneering various bio-engineering techniques for slope stabilization and vegetation of decommissioned roads.

The headwater species association will benefit from the reduction in the number of road-associated debris flows, which scour alluvial cover and woody debris from headwater streams in

the CUP leaving a bedrock channel. The recovery of alluvial cover and woody structure in "torrented" headwater channels is slow and the *prevention* of debris flows and the attendant loss of intact headwater channels is a significant benefit for all species of stream breeding amphibians. The steep and flat tributary species associations also will benefit because debris flows that are caused by roads often propagate through steep highly confined tributaries and run out in the flatter segments where these species reside. These run out zones can be substantially altered causing the loss of habitat structure and woody debris cover. In extreme cases, these reaches may accumulate so much sediment that surface flow is lost during the summer, eliminating all rearing habitat for fish.

6.2.4.3 Road Maintenance

Current operational problems (those identified mainly in areas of active haul) will be handled through a variety of methods, all with the goal of reducing sediment input to streams. Methods used will focus on operationally appropriate solutions and could include but are not limited to, temporary cessation of haul, better road surfacing, improved road drainage features, and sediment trapping techniques. The focus of Simpson's road maintenance activities will be on fixing the cause of the problem, not merely addressing the symptoms. For example, if an in-board ditch is found to have been eroded, the ditch line may need to be armored. However, Simpson will also address the cause of the problem by reducing the amount of water the ditch carries. This could be accomplished by adding more cross drains, constructing driveable dips, outsloping the road or undertaking other appropriate management efforts designed to minimize the chance that the problem will recur.

Primary benefits from the road maintenance program will come as a reduction in fine sediment delivered to streams, elimination of longstanding emergency repair problems, and the retention of more woody debris within the stream system. These benefits will primarily accrue to the flat tributary species association since that is where much of the fine sediment may settle out.

6.2.4.4 Road Use

Road closures were designed to be a principal benefit to wildlife species, especially elk (see Section 6.3.6.1). However, road use is the main factor causing surface erosion of roads and any limitation on road use has the potential to benefit aquatic species through a reduction of fine sediment delivered to streams. This may be especially helpful to the headwater species association, particularly tailed frog and Cope's giant salamanders that need interstitial space between and beneath cobbles for breeding and rearing. Further downstream in the flat tributary association habitats, sculpin will benefit from the reduction of fine sediment which can cause the channel bed to be come "embedded", that is the larger clasts are embedded within a matrix of fine sediment, preventing access to voids in the stream bed for breeding and egg nest establishment. This same reduction of fine sediment has positive benefits for salmonid spawning habitat.

6.2.4.5 New Road Location, Design, and Construction

New roads will be constructed to standards that minimize their impacts on natural channel function and the free movement of fish. Stream crossings will receive special attention in the prescriptions (Section 5.2.4.6 (c)), due to the risks of creating disconnects in the fluvial transport of materials and the passage of fish. The steep and flat tributary species associations will be the principal beneficiaries of results that will come from the implementation of new road construction standards. Free movement of juvenile salmonids will be preserved, the sediment production from new roads will be substantially reduced, and the risk of future failure of road fills should be virtually eliminated.

6.2.5 Explanation of the Unstable Slopes Management Program

The Plan Area has a wide range of slope stability conditions, some of which can be aggravated by forest management activities. Simpson will control management influences on hillslope instability by identifying unstable slopes and applying prescriptive measures that are designed to prevent the triggering of mass wasting processes. Simpson personnel will analyze slope stability issues for all harvest units and road layout and building during the normal course of operations. A qualified geotechnical expert will be retained when uncommon circumstances are encountered in high risk areas.

Simpson has conducted Washington State Watershed Analyses pursuant to WAC 222-22 in three Watershed Administrative Units: Kennedy Creek, West Fork Satsop River, and the South Fork Skokomish River. These three watershed analyses were conducted on landforms that represent slope stability issues found in four of the five LTUs in the Plan Area. Only the AGL is not represented in these analyses. The ROP is underrepresented but the slope stability issues that exist in this LTU are well covered by the analyses of the glacial landscapes covered in the South Fork Skokomish analysis. Other areas of the ROP are virtually devoid of slope stability issues. Fortuitously, the AGL has the fewest mass wasting issues of all the LTUs except the ROP. These analyses have been conducted by professional geologists specializing in fluvial and hillslope processes, the reports have been scrutinized through a peer review process, and the resulting prescriptions have been exposed to additional comment and review through the Washington State Environmental Policy Act notification and promulgation processes.

Pursuant to Section 5.2.5 Simpson will complete a slope stability analysis for the entire Plan Area. In the interim, and for areas yet to be formally analyzed, Simpson will apply the information on mass wasting processes from the formal analysis units. For example, due to similar geology and landforms, the West Fork Satsop River analysis could be applied to the Middle Fork Satsop River and its tributaries; the analysis of the basalt geology mass wasting issues from the South Fork Skokomish River are applicable to the CUP; and the Kennedy Creek analysis provides useful mass wasting information directly applicable to other areas of the CIS that are not under formal analysis.

Principal benefits to be derived from the application of the Unstable Slope Management Program (5.2.5) are a reduction in delivery of coarse and fine sediment to a wide array of channel classes. These prescriptions will directly benefit every aquatic species associations through a reduction of immediate site level and long term basin level cumulative effects. In particular, the flat tributary species association will enjoy improved breeding habitat. For coho and chum salmon this means less fine sediment in streambed gravels and for the cottid species it means more open interstitial space beneath cobbles and boulders for nesting and egg incubation. Pool habitat will be deeper if less coarse sediment is delivered to low gradient streams and channel geometry will be maintained within limits conducive to cooler water temperatures.

The following are some specific examples of mass wasting prescriptions that are excerpted from the completed Watershed Analyses. These particular prescriptions were selected from several options for each mass wasting unit because they are the ones commonly practiced by Simpson today. Reviewers are directed to Appendix H and the documents themselves, which are available through the Washington Department of Natural Resources for a complete compendium of related materials.

Kennedy Creek Watershed Analysis, February 1995

Mass wasting unit and process	Road Prescription	Timber Harvest Prescription
1a and 1b: Planar to concave, moderate to steep terrace escarpments in gravelly sand and loam. Prone to debris slumps and sand flows.	No road construction across these mass wasting areas.	No broadcast burning. Inventory and eliminate harvest activities within 25 feet of seeps and wet areas.
3d: Steep slopes adjacent to streams including the toes of ancient slumps in loamy sand to very gravelly sand. Prone to debris slumps and earthflows.	No road construction across these mass wasting areas.	No harvest.

West Fork Satsop Watershed Analysis, November 1995

Mass wasting unit and process	Road Prescription	Timber Harvest Prescription
9 and 12: Large-persistent deep-seated and shallow rapid landslides on escarpments in tributary valleys.	No road construction unless road plan is fully engineered by forest engineer and approved by DNR. (Road plan must address specific triggering mechanisms of mass wasting unit.)	No harvest in areas that could deliver to channels.
1 and 10: Large persistent landslides and associated shallow rapid landslides on river escarpments.	No road construction.	No harvest.

South Fork Skokomish Watershed Analysis, October 1997

Mass wasting unit and process	Road Prescription	Timber Harvest Prescription
1 and 2b: Gorges and actively undercut alluvial valley walls. Prone to shallow rapid landslides and stream bank failures.	No road construction.	No harvest.
2a, 6 and 8a: Valley walls, glacially overridden uplands. Prone to shallow rapid landslides and debris flows.	No road construction on delivering slopes.	No harvest on delivering slopes.

6.2.6 Explanation of Hydrologic Maturity Prescriptions

The harvest of timber in the CUP has the potential to alter stream hydrology through influences on snow accumulation and snow melt during rain-on-snow events (ROS). In the ROS zone, the lack of a mature forest canopy (> 70 percent crown closure) allows more snow to accumulate on the forest floor and less to be trapped in the canopy where it is evaporated directly back to the atmosphere before it has an opportunity to become surface water runoff. As referred to here, the ROS zone is an elevationally defined region (1,200-4,000 feet above mean sea level) where snow is more likely to accumulate and then rapidly melt during rainstorms. An increase in peak flows due to increased snow melt runoff in the ROS zone can cause damage to stream habitat through increased scour of the channel bed or erosion of the channel banks. Both of these processes can substantially disrupt the incubation environment of fall spawning salmonids and limit their reproductive success. These same processes can cause damage to rearing habitat through erosion.

Simpson has evaluated the Plan Area for sub-basins that lie within the ROS zone and has identified seven sub-basins of the CUP which need to be managed for hydrologic maturity (Table 5). Application of the hydrologic maturity prescriptions identified in Section 5.2.6 should result in sufficient mature forest canopy cover to avoid peak flow damage due to ROS issues. The forest cover thresholds identified in Section 5.2.6 were developed through hydrologic analyses preformed for the south Fork Skokomish watershed analysis and have received both a peer review and public SEPA comment (Rhett Jackson, analyst, 1996).

The road system can also intercept water as it falls directly on the road surface and from road cuts during storms. This intercepted water is routed through the watershed relatively quickly if the road system is highly connected to the channel network, and may cause increases in peak flows or decrease the time to peak flow. Prescriptions in Section 5.2.4 will minimize potential impacts to stream hydrology from these processes through the use of frequent cross drains and other measures to keep water from being routed quickly through the ditch system to streams.

The headwater species association will benefit directly because the management prescriptions (and additional mitigation provided through road remediation as described in Section 5.2.4.2) will decrease the frequency of storm flows capable of shifting instream structures that stabilize their rearing and breeding habitat (Table 12). Tailed frog larvae spend a winter in headwater streams in the Plan Area, exposing them to potentially damaging peak flows. Cope’s giant salamanders are primarily neotenic within the Plan Area (Simpson has observed only two terrestrial morphs, Simpson unpublished data), and so will be substantially protected by the elimination of management influences on headwater stream hydrology. The steep tributary species association will also benefit from the Hydrologic Maturity management prescriptions through the elimination of management influences on peak flows. Downstream benefits will accrue to the flat tributary species association through the lessening of coarse and fine sediment transport to their habitats. This will improve both the quality of the spawning gravels for species like coho and chum and improve the character of pool habitat for those members of the association that spend extended periods of time rearing in freshwater (e.g. coho and riffle sculpin).

6.2.7 Explanation of Experimental Management

Two legacies that persist from the first logging in some parts of the Plan Area are the lack of woody debris in some channels and hardwood dominated riparian forests in some settings. These conditions are not pervasive but do occur with enough regularity to warrant attention. These conditions have been created by a variety of causes including: logging of riparian forests, mis-guided stream clean out programs, cedar salvage, and natural successional pathways associated with wet riparian sites.

Simpson will engage both these subjects on a pilot project level to determine if any operationally practical prescriptions may be identified to hasten stream and riparian conditions favorable to fish and wildlife. The habitat monitoring program will generate information about the distribution of these conditions by channel class to provide a landscape context. The principal beneficiaries of this kind of research will be the flat tributary species association since the lower gradient tributaries were the most affected by the practices mentioned above (Table 12). Significant benefit could potentially accrue for salmonid species or age classes that rely on pool habitat (e.g. coho and older year classes of cutthroat and steelhead parr).

6.2.8 Explanation of Supplemental Prescriptions due to Changed Circumstances

Since it is impossible to predict the spatial or temporal patterns of natural disturbances that will be addressed by the changed circumstances prescriptions, benefits are difficult to specify except in general ways. The principles that have been established for dealing with operations in the face of "changed circumstances" however, will promote the maintenance of natural disturbance legacies such as snags, downed wood, and structural diversity of stream and riparian systems. These are valuable and long lasting components of natural landscapes that benefit multiple wildlife species. All of the species addressed by this HCP may at some time be favorably impacted by the contingencies established pursuant to Section 5.2.8 but in particular snag dependent bird species and amphibians that use downed wood may be especially benefited.

6.3 EXPLANATION OF SPECIFIC WILDLIFE SPECIES CONSERVATION MEASURES

6.3.1 Marbled Murrelet

In Washington and Oregon marbled murrelets nest, almost exclusively, in large trees (greater than 32 inches DBH) typically within old-growth (greater than 120 years old) or older-age coniferous forests. These forests provide large limb structures for nest substrates, multi-level canopies for in-stand flights, and adjoining trees that provide hiding cover from predators and protection from winds. Murrelet nesting also usually occurs below 3,500 feet elevation and within 35 miles of coastal waters. The amount of murrelet nesting habitat in Washington and Oregon has declined during the past 40 years partially as the result of timber harvest on public and private lands. Habitat remaining in low elevation areas may be critical to the long term survival of this species. As part of this plan, Simpson has agreed to conserve all murrelet nesting habitat within the RCR and all murrelet nesting habitat outside the RCR (identified in Figure 5) that is shown to be occupied with surveys.

The HCP area was assessed for murrelet habitat in 1995 (refer to Appendix A for a description of the methods). Results of that work show currently there are 598 acres of murrelet habitat within the RCR that will be conserved during the plan period (Figure 8). An additional 540 acres of habitat exists outside the RCR that may be conserved if surveys show those stands to be "occupied" by murrelets. Additionally, we expect that during the 50 year period other coniferous stands in the RCR will develop into murrelet habitat to provide an additional 162 acres of habitat by year 2024, and 1,231 acres by year 2049 (Table 14). Total murrelet nesting habitat at the end of the plan period is expected to be at least 1,991 acres (not including any of the 540 acres of habitat outside the RCR that may or may not be occupied).

Simpson began implementing two-year marbled murrelet surveys at 17 survey sites in 1998. Two-year surveys also were initiated at an additional 23 survey sites in 1999. These 40 survey sites encompass all murrelet habitat known to exist in the HCP area, as identified during the 1995 habitat surveys. These surveys consist of at least 10 surveys per survey site, and the surveys are

being conducted according to PSG protocol as described in Section 5.3.1. All surveys will be completed during Year 2000. As of August 1999 occupied murrelet behavior had been recorded at two survey sites in the Wynoochee River Valley. Murrelet presence also had been detected at four other sites in that drainage.

Table 14. Coniferous forest greater than 70 years of age in the RCR in relation to known and estimated future potential murrelet nesting habitat.

Forest Age Class in 1998 (Year 1)	Total Acres in 1998	Acres of Murrelet Habitat in 1998	Potential Acres of Habitat in Year 25	Potential Acres of Habitat in Year 50
71-100	2,461	0	0	1,231
100+	921	598	162	0
Cumulative Total Habitat		598	760	1,991

This table does not include the 540 acres of known murrelet habitat outside the RCR that will be conserved if surveys show them to be "occupied" stands. Additionally, potential habitat in the RCR, at Year 25 and 50 of the plan period was estimated by assuming that a minimum 50 percent of the coniferous forest greater than 120 years old, that is not currently classified as murrelet habitat, would most likely become murrelet nesting habitat. The rate of murrelet habitat development was limited to 50 percent of stands greater than 120 years old in order to take into account uncertainties in habitat quality, such as stand size and forest fragmentation.

6.3.2 Bald Eagle

Bald eagles typically nest in older and large (greater than 32 inches DBH) dominant or co-dominant trees within old-growth or older-age coniferous forests. These nest sites are usually near foraging areas, such as lakes, streams and coastal waters. Human activities near nest trees can cause eagles to abandon nests or result in reduced productivity (Anthony et al. 1982). Trees, other vegetation and topographic relief surrounding the nest tree can help reduce disturbance caused by humans and also provide protection from adverse weather. Anthony and Issacs (1989) recommend that habitat alterations (such as timber harvest) should not occur within 2,600 ft of nests. Refer to Appendix A for further details of the eagle life history.

Wintering bald eagles typically concentrate in areas where food is abundant and disturbance is minimal. The eagles will perch near food sources (e.g. lakes, streams and coastal waters) during the day and move to communal roost sites during the evening. Eagles may gather at staging areas (larger trees protruding above the forest canopy) between their foraging areas and the roost areas, prior to entering the night roost. Communal roost sites are generally in uneven aged forests with multilevel canopies. Specific trees used for roosting appear to be selected for their ability to shelter eagles from inclement weather, such as wind and rain, and from disturbances.

The communal roost site near the confluence of the North Fork and South Fork Skokomish Rivers has not been surveyed or intensively studied. Periodic observations made during the 1980's and 1990's, however, indicate that as many as 30 eagles roost in this area, and that they use a staging area in Section 6, Township 21, Range 4 (Schroer, pers. comm. 1997). As part of this plan, Simpson has agreed to develop a bald eagle management plan for this particular communal roost site, which will include lands within the North Fork Skokomish River LFR.

6.3.3 Band-tailed Pigeon

The band-tailed pigeon is a neo-tropical migrant species that inhabits the HCP area during the spring through fall seasons each year. This species nests in a wide variety of forests; primarily older than 30 years of age (Appendix A). Within the HCP area, nesting habitat does not appear to be a limiting factor. Mineral springs are also important to this species, especially during the

breeding season; however, no mineral springs are known to exist in the HCP area (Appendix A). Specific management that Simpson can implement to help conserve band-tailed pigeons is the conservation of their forage plants. Within the context of Simpson's forest management, it is impossible to conserve all forage resources; however, as part of this plan, Simpson will refrain from targeting herbicides on primary forage plants in the areas with the greatest abundance of such resources, as described in Section 5.3.3.

6.3.4 Harlequin Duck

Harlequin ducks rely on a variety of riparian vegetation for nesting and the streams and rivers for foraging. The RCR program will help ensure most, if not all, the nesting habitat of this duck is maintained and in some cases enhanced through time. Additionally, nesting harlequin ducks will be protected by instituting the closures identified in Section 5.3.4 immediately after a nest site is confirmed. These closures will remain in effect until the ducks have fledged their young. Reducing activity near the nest site during the incubation and fledging period will reduce the chance for inadvertent disruption of the nesting birds, which could result in the abandonment of the nest. Refer to Appendix A for more detail regarding this species.

6.3.5 Roosevelt Elk

6.3.5.1 Road Closures

Currently Simpson has an ability to restrict motor vehicle access to 12 areas in the HCP area, totaling 135,033 acres (52 percent of total HCP area) (Table 16 and Figure 9*)*[14]. At a minimum, Simpson will maintain year-around closures to all public motorized traffic in areas 1, 2, 3, 7, 9, and 12, or other areas which total at least that same amount, which is approximately 36,000 acres. These roads will be closed to all traffic other than that which is related to Simpson business, and the closed areas will remain closed throughout the year except when they need to be opened as required by law. The road closure program is conditional upon the MOU referenced in Section 5.3.6(b).

Research has shown elk tend to avoid areas with road motor vehicle traffic (Marcum 1975, Hershey and Leeg 1976, Perry and Overly 1976, Rost and Bailey 1979, Whitmer and DeCalestra 1985). This avoidance behavior results in a decreased capacity of the land to support elk because of less habitat availability and higher stress levels (Lyon 1979, 1983; Pederson 1979). Research conducted by Leptich and Zager (1991) showed higher bull mortality rates (61.7%) in highly roaded areas than the rate (31.3%) in areas with few roads. Additionally, only 5 percent of the bulls in the highly roaded areas lived to maturity and none lived more than 5.5 years, whereas in areas with road closures 16 percent of the bull population consisted of mature animals and the average life span was 7.5 years. This impact and loss to elk populations resulting from road access can be minimized by closing roads to nonessential traffic.

[14] An additional 7,344 acres of timberlands owned by third parties adjacent to Simpson lands are also regularly closed to the public.

Table 15. Linkages between wildlife species, resource objectives, management prescriptions and expected benefits.

Species	Wildlife Resource Objectives (Described in HCP Section 4.2)	Management Prescriptions (Described in HCP Section 5)	Expected Benefits
Marbled Murrelet	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve riparian habitat: 5.2.1 Conserve existing and future habitat in RCR: 5.3.1 (b) (d) Conserve occupied habitat outside RCR: 5.3.1 (c) Limit harvest in buffers: 5.3.1 (e) (f) (g)	All occupied habitat in and outside RCR will be conserved. At least 1,400 acres of additional nesting habitat are expected to develop in the RCR and they will be conserved. Most buffers of occupied habitat protected, and potential management disturbances will be minimized.
Bald Eagle	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve riparian habitat: 5.2.1 Conserve wetlands: 5.2.3 Conserve nests: 5.3.2 (b) Conserve communal roost: 5.3.2 (b)	All nest sites will be conserved. Most existing and future perch sites along rivers and wetlands also will be conserved. A management plan will be developed to conserve the communal roost site.
Band-tailed Pigeon	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve wetlands: 5.2.3 Protect wetlands from herbicide: 5.3.5 (a) Protect forage plants: 5.3.5 (b)	Wetlands can contain a high abundance of forage species for this pigeon and the wetland conservation of this plan will help conserve these resources. Herbicide spraying in and near wetlands will not occur, which will help maintain forage species. Additionally, areas with high concentrations of forage species in the uplands will also be protected from herbicide spraying.
Harlequin Duck	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve riparian areas: 5.2.1 Conserve wetlands: 5.2.3 Limit mgmt. disturbances: 5.3.6 (b)	Riparian areas will be conserved to ensure adequate protection of nesting habitat. Potential management disturbances to nest sites also will be minimized.
Roosevelt Elk	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve riparian areas: 5.2.1 Close roads to public access: 5.3.7 (b) Seed forage species: 5.3.7 (c)	Riparian areas conserved, and these areas contain many habitats preferred by elk (deciduous bottomland forests, riverine meadows and mixed forests). Roads across at least 30,000 acres will be closed to nonessential traffic, which will increase habitat availability and decrease illegal hunting losses. Forage seeding will provide high levels of nutrient availability in limited areas.
Snag Dependent Species	Riparian conservation (Objective 1) Late-seral forests (Objective 2) Specific species mgmt. (Objective 4)	Conserve riparian areas: 5.2.1 Conserve wildlife trees: 5.2.2 Conserve wetlands: 5.2.3	Riparian and wetland buffers (including forested wetlands) are snag rich areas that will be conserved for the plan duration. Larger size snags also will be recruited as a result of this conservation. Single and small groups of wildlife trees also will be conserved across the HCP landscape to provide for some upland snag distribution.

The purpose of road closures is to increase the availability of habitat to wildlife species, reduce illegal hunting and reduce surface erosion of roads. This program will provide direct benefits to many wildlife populations, particularly large mammals that are hunted, including elk, deer, bear, cougar and bobcat. Additionally, road closures will have direct benefits to aquatic ecosystems and the species covered by the ITP, through a reduction in road use which is a primary cause of road surface erosion.

Road Closure Area Number	Acres of Simpson Ownership	Acres of Other Ownership
1	9,729	1,178
2	10,002	48
3	5,443	313
4	30,929	343
5	18,464	1,788
6	8,118	149
7	5,548	0
8	7,388	5
9	3,049	510
10	26,423	1,441
11	7,698	704
12	2,242	2
Total	**135,033**	**6,481**

Table 16. Summary of areas, and the acreage, which will have Simpson roads closed to public motor vehicle traffic.
Figure 9 shows the location of these road closure areas.

6.3.5.2 Forage Seeding

A herbaceous seeding program will be implemented on 50 percent of the deactivated roads in road closure areas 1, 2, 3, 7, 9, and 12. This will provide high quality forage "core areas" in the HCP area for Roosevelt elk and to a lesser degree, black-tailed deer. Forage seeding provides an effective means for supplementing elk nutrition and energy reserves, which can result in higher population survival, recruitment and reproductive rates. This seeding will be accomplished on roads and landings that are permanently closed to motor vehicle use. Seeded roads and landings typically retain herbaceous plants longer than in harvest units, because young coniferous stands reach stand closure at approximately 18 years of age, which eliminates most herbaceous understory.

6.3.6 Snag Dependent Species

Another primary wildlife habitat conservation goal of this HCP is to conserve and develop snag habitat. This type of habitat, particularly the larger size classes, is currently less abundant than it was historically. More than 50 bird and mammal species have evolved a dependence on such habitat for foraging, nesting, roosting, and denning. With the advent of industrial forestry in this century, these types of wildlife habitat structures were progressively removed from the landscape. With shorter timber harvest rotations and more efficient use of each acre, older trees and those with decadence have become scarcer. That rarity continues today in many low elevation forests of western Washington, except generally for snags less than approximately 12 inches DBH.

During 1996 Simpson conducted forest inventories at 30 sites distributed throughout the proposed RCR (Appendix E). Results of this initial assessment showed an average of 7.9 conifer snags per acre in the RCR of which 5.7 were between 4 and 12 inches DBH, 1.06 snags per acre were.12-24 inches DBH, and 1.14 snags per acre were greater than 24 inches DBH. Simpson will conserve existing snag habitat in the RCR and also conserve snags and potential snags, through other programs such as the wildlife tree conservation program and the wetland conservation program, which will conserve at least 50 percent of the forested wetlands.

A majority of the species addressed by this plan require snags in the medium and small size classes (refer to Appendix A for descriptions). The number and type of existing snags in the RCR and other areas, such as wetlands, combined with the development of future snags through conservation measures (e.g. minimum of 8 leave trees per acre of each section of land) will ensure these species populations in the Plan Area are maintained and enhanced.

As part of this effort, Simpson will inventory the quantity and quality of snags in the RCR during the plan period. These inventories will be a statistically valid sampling of forests adjoining each channel class and wetland type.

7 POTENTIAL IMPACTS, MINIMIZATION AND MITIGATION MEASURES

7.1 GENERAL

A required element of all HCPs is a description of the "impacts likely to result from the proposed taking of the species for which permit coverage is requested" (USFWS and NMFS 1996). This requires an identification of the mechanisms whereby impacts may occur and an assessment of the extent of any such potential impacts. This section identifies the potential impact of the permitted activities and includes an evaluation of the consequences of this level of impact on the ability of the covered species to survive and recover in the wild.

The following analysis discusses anticipated impacts of permitted activities rather than focusing only on the effect of actions which might constitute "take" under the ESA. Not all impacts result from "take". Take is narrowly constrained by statue, legal precedent, and agency policy. Identifying "take" for species which are not yet listed and for which no 4(d) regulations or take guidelines have been promulgated is particularly problematic. Moreover, the physical mechanisms that cause impacts are highly variable in time and space. Many adverse impacts will have only tenuous connections to current permitted practices and are more likely the effects of historical legacies and their interaction with natural processes. Adverse consequences that result from preexisting conditions do not constitute a take. By focusing generally on the potential result of all the permitted practices, the following discussion covers the required impacts of any incidental take and more.

This Section also analyzes the minimization and mitigation of impacts that are contemplated by the Plan. The Plan will minimize and mitigate to the greatest extent practicable the impacts of any incidental take to a covered species which may occur as a result of permitted activities. This Plan will ensure that any taking of the covered species will not appreciably reduce the likelihood of such species' survival and recovery in the wild. In many instances the actual effect of implementing the management prescriptions will be more beneficial than avoiding take altogether. Mitigation included in the HCP addresses legacies of past practices and in some instances aspects of the animal's habitat not associated with current operations. In a number of instances, the implementation of the Plan will result in an improvement for covered species beyond what would result from a strict no-take approach.

7.2 POTENTIAL IMPACTS ASSOCIATED WITH THE HCP

7.2.1 Aquatic Species

Stream systems integrate conditions throughout their watersheds and are also affected by reach level factors associated with riparian forests and stream-adjacent hill slopes. Because fluvial systems function in this manner, aquatic species and habitat some distance from proximate causes may be impacted through both direct and indirect pathways. Of course, not all of these circumstances would constitute a take. Set forth below are examples of how impacts could occur for each aquatic species association as a consequence of the permitted activities. A reasoned analysis of the potential extent and consequences of these impacts is also included.

7.2.1.1 Headwater Species Association

The headwater species association is composed of the Olympic torrent and Cope's giant salamanders, tailed frog, and the western redback salamander. Living in or immediately adjacent to headwater channel classes (e.g. CUP-C1 or SIG-L1) occasionally subjects these species to catastrophic physical processes such as shallow rapid landslides and debris flows (Table 17). These kinds of mass wasting events will occur in headwater landscapes even in the absence of forest management activities. However, the potential for increasing the rate and distribution of these events through the interaction of management activities and large natural storm events will always exist in the managed landscape.

Impacts to members of the headwater species association may occur through their direct entrainment into the mass of sediment and wood resulting from a debris flow. Debris flows and landslides can also adversely affect habitat and food resources of these species due to channel scouring and sediment deposition. The loss of alluvial cover in steep headwater channels can be damaging because it can destroy interstitial rearing space and large quantities of deposited sediment may cause streams to lose their surface flow. The Olympic torrent and Cope's giant salamander and the tailed frog are especially susceptible to these kinds of habitat alterations. Debris flows and landslides associated with management activities will be rare under the Plan; however, they may occur. In the event that such mass wasting occurs it will likely be associated with large storms which will likely trigger similar events on unmanaged forest lands.

In spite of a long history of intensive forest management in the Plan Area, stream breeding and riparian associated amphibians are well represented in headwater channel classes in the Plan Area (Simpson Timber Co. unpublished data). These headwater species populations are smaller where debris flows and streamside mass wasting have occurred in the recent past; however, they have not been eliminated. Although it is impossible to predict where, when, or exactly how many of these events may occur, their rate and distribution will be substantially lower and less wide spread than under past management practices. Based on this, Simpson forecasts an improving trend in the condition of habitat in headwater channels as a result of the implementation of the Plan. Although it will be difficult to measure and will occur over a long time period, this result will also most likely lead to a moderate increase in the numbers of headwater amphibians and somewhat wider distribution. Simpson concludes that any impacts incurred and associated with the permitted activities will be insignificant and largely immeasurable at the LTU or channel class level and in no event will they imperil the recovery of members of this species association in the wild.

7.2.1.2 Steep Tributary Species Association

The steep tributary species association is composed of two species of fish, coastal cutthroat trout ("ONCL") and shorthead sculpin ("COCO"), and one riparian associated amphibian, Van Dyke's salamander ("PLVA"). Members of this species association occur in the steep highly confined tributary channel classes of the CUP and AGL (e.g. CUP-C2, 3, 4, 8; AGL-Qo1).

The principal physical processes affecting the steep tributary environment that could impact these species are twofold: shallow rapid landslides and the transmittal of debris flows through steep highly confined channel segments (Table 17). Steeper tributary streams function as transport systems for wood and sediment derived from headwater channel segments or valley walls. The physical processes described above may harm individuals directly or modify their habitats to the extent that their survivability is compromised. As debris flows travel through a reach, they can locally scour the streambed which can kill incubating eggs and larval fishes and debris laden water can kill free swimming juvenile and adult fishes.

In some reaches that are recovering from historical logging practices or large natural disturbances, the population size of some steep tributary species is reduced but multiple year classes are present indicating reproduction is occurring. Habitat in steep tributary systems in general is resilient to physical effects because it tends to be dominated by bedrock and boulders, which provide stable elevation control at the habitat scale. Conditions overall will be on an improving trend as a result of the implementation of the Plan and it is expected that these systems will continue to develop productively. Any adverse consequences that may be occasioned by the processes characterized above and which relate to any permitted activity will be insignificant and impossible to quantify at the LTU or channel class level and will not impede the recovery of any such covered species in the wild.

7.2.1.3 Flat Tributary Species Association

The flat tributary species association is diverse and includes coho ("ONKI") and chum salmon ("ONKE"), riffle ("COGU"), reticulate ("COPE"), and coast range sculpin ("COAL"), speckled dace (RHOS"), and western brook lamprey ("LARI") (Table 1). This species association populates some of the most productive and important fish-bearing channel classes in the Plan Area, including the CIS-Qc3, ROP-Qc3, 5, 6, 7, and AGL-Qo5, 6, 7.

Impacts to this group may occur through the deposit of coarse sediment, the accumulation of fine sediment in spawning gravels, and elevated water temperatures (Table 17). Coarse sediment is delivered to channel classes supporting the flat tributary species association from multiple upstream sources, side slope failures, and lateral erosion of banks and low terraces. Fine sediment is delivered through the same processes and through surface erosion of the running surface and ditch line of forest roads. Water temperatures may be elevated through the reduction of density in the riparian forest canopy and changes in channel geometry associated with coarse sediment accumulation.

Especially large accumulations of coarse sediment in low gradient channels can lead to the loss of surface flow and death of individuals in those reaches while coarse and fine sediment deposited on the channel bed could entomb salmonid larvae. Elevated water temperature may make stream habitat inhospitable to individuals inhabiting these reaches. In the case of temperature, the actual agent of harm may be heightened susceptibility to disease or predation. It is unlikely that temperatures would reach lethal levels even in the most extreme circumstances.

In spite of a long history of intensive forest management in the Plan Area, all of the fish native to Plan Area flat tributaries are well represented today (Simpson Timber Co. unpublished data). Habitat in tributary systems overall will be on an improving trend under HCP management and it is expected that conditions will continue to develop productively for the flat tributary species association. The impacts that may be occasioned by the processes characterized above and which relate to any permitted activity will be insignificant and impossible to quantify at the LTU or channel class level and will not impede the recovery of the covered species in the wild.

7.2.1.4 Mainstem Species Association

The mainstem species association has 10 members including the western toad ("BUBO"), Pacific lamprey (LATR"), and river lamprey ("LAAY") (Table 1). Other members include chinook ("ONTS"), steelhead ("ONMY"), pink salmon ("ONGO"), and bull trout (SACO"), dolly varden ("SAMA"), torrent sculpin ("CORO"), longnose dace ("RHCA"). Members of this association (and some others not covered by this HCP) do not all occur together in the same segment but

often occur as a suite of 6 or 8 species, the composition of which depends on the character of the habitat. Mainstem channel classes include ROP-Qa7, Qc7, 8, SIG-L4, M5, and AGL-Qa6, Qo-8.

Members of the mainstem species association could be impacted in much the same way as those in the flat tributary association; however, the direct linkages to management are more difficult to demonstrate for this group. This difficulty stems from the problems associated with establishing cause and effect relationships between land management and in-channel habitat conditions in large rivers. Impacts could occur as a consequence of management influenced landslides but mass wasting events this large always have large contributing natural factors, such as the lateral erosion of landslide toes by the river. Linkages between management activities and temperature effects in the mainstem environment are tenuous due to the naturally open canopy of large channels.

Not all of the fish native to Plan Area mainstems are well represented today (e.g. Skokomish River spring chinook and pink salmon and Wynoochee River spring chinook are either very rare or have been extirpated). These races of salmon have been subject to significant habitat and fishery pressure over many decades. In the case of the Wynoochee spring chinook the dam may be implicated and fisheries early in the century may have significantly affected Skokomish River pink salmon while little consensus exists on the size or history of the Skokomish River spring chinook run. Habitat in main rivers overall will be on an improving trend under HCP management and it is expected that conditions will continue to develop productively for the mainstem species association (in part due to the lack of forest management activities and the active sediment abatement work in headwater areas on U.S. Forest Service ground; see Section 3). The impacts that may be occasioned by the processes characterized above and are associated with any permitted activities will be insignificant and impossible to quantify at the LTU or channel class level and will not impede the recovery of the covered species in the wild.

7.2.1.5 Lentic Species Association

The lentic species association is composed of three species of fish: the prickly sculpin (“COAS”), threespine stickleback (“GAAC”) and Olympic mudminnow (“NOHU”); and three species of pond breeding amphibians: the Northwestern salamander (“AMGR”), long toed salamander (“AMMA”) and red legged frog (“RAAU”). No significant levels of impact are expected to any of these populations because management resulting from this plan will not directly impact a majority of lentic habitats. Some direct impact could occur as a result of harvesting in forested wetlands. Removal of forest cover in these areas could significantly alter the temperature and moisture conditions during summer months, and under certain circumstances lead to the death of some amphibians. Any such adverse impacts that may occur will not imperil or prevent the recovery of any member of this species association in the wild.

Table 17. Potential impacts to aquatic species associations, habitats, and HCP minimization and mitigation measures.

Aquatic Species Association	*Potential* Impact Mechanisms[15]	Extent of Impact	Minimization and Mitigation[16]	Adverse Impact on Recovery of Species in Wild
Headwater	Loss of functional riparian habitat, increased water temperature, fine sediment accumulation in channel, shallow rapid landslides, increase in frequency of peak flows, road fill failures, debris flows.	Minor	Riparian reserves, 5.2.1; Road maintenance, 5.2.4.3; Road Use, 5.2.4.4; Road design, 5.2.4.5; Unstable slopes, 5.2.5; Hydrologic maturity, 5.2.6; Road remediation[17], 5.2.4.2.	None
Steep Tributary	Loss of functional riparian habitat, increased water temperature, fine sediment accumulation in channel, shallow rapid landslides, increase in frequency of peak flows, road fill failures, debris flows.	No change	Riparian reserves, 5.2.1; Road maintenance, 5.2.4.3; Road Use, 5.2.4.4; Road design, 5.2.4.5; Unstable slopes, 5.2.5; Hydrologic maturity, 5.2.6; Road remediation, 5.2.4.2.	None
Flat Tributary	Loss of functional riparian habitat, increased water temperature, fine sediment accumulation in spawning gravels, coarse sediment accumulation and loss of summer surface flow, loss of pool habitat and woody debris cover, dam break floods and debris flow run outs.	Improve	Riparian reserves, 5.2.1; Road maintenance, 5.2.4.3; Road Use, 5.2.4.4; Road design, 5.2.4.5; Unstable slopes, 5.2.5; Hydrologic maturity, 5.2.6; Experimental mitigation, 5.2.7; Road remediation, 5.2.4.2	None
Mainstem	Loss of functional riparian habitat, shallow rapid and deep seated landslides, chronic delivery of sediment from small tributaries.	No change	Riparian reserves, 5.2.1; Road maintenance, 5.2.4.3; Road Use, 5.2.4.4; Road design, 5.2.4.5; Unstable slopes, 5.2.5; Hydrologic maturity, 5.2.6; Road remediation, 5.2.4.2	None
Lentic	Sedimentation of wetlands, piracy of water and consequent alteration of wetland hydrology, loss of riparian habitat.	Improve	Wetlands, 5.2.3; Road maintenance, 5.2.4.3; Road Use, 5.2.4.4; Road design, 5.2.4.5; Road remediation, 5.2.4.2	None

[15] Depending on the degree of management influence and the degree to which individuals of a covered species are "harmed", some of these impacts could be construed as "take".
[16] Numbers refer to Sections of the Plan where prescriptions are described that will provide the minimization and mitigation for potential impact mechanisms.
[17] Road remediation is listed as mitigation for all aquatic species associations because sediment delivery to all of these habitats will be reduced through these activities.

7.2.2 Wildlife Species

The following sections assess the potential impacts of covered activities on wildlife species addressed by the HCP. Impacts are assessed based upon the amount of habitat lost or impaired, or by other impacts, such as the effects of temporal management activities on the species.

7.2.2.1 Marbled Murrelet

This plan will conserve and protect all occupied marbled murrelet habitat outside the RCR, and also murrelet habitat in the RCR regardless of whether it is occupied. Some disturbances could occur to occupied murrelet habitat within the RCRs due to timber harvest that may occur within the 300 ft buffers that fall outside the RCR boundary. This harvest activity, however, would not occur to the first 150 acres of buffer identified outside the RCR. After that threshold is reached we do not expect more than 200 acres of buffer habitat to be impacted by management actions.

A relatively small percentage of occupied murrelet habitat buffers will be impacted by timber management due to the following reasons. Currently there are approximately 36 separate potential murrelet nesting habitat areas inside the RCR or that abut the RCR boundary. An estimated average of 80 percent of the boundaries of these habitats are entirely within the RCR. That leaves only 20 percent of the boundaries that could potentially be harvested. However, given the fact that the first 150 acres of this type of buffer habitat will be conserved, we estimate that all, or most all of these habitat buffers would receive complete buffer protection, if these areas are found to be occupied. This 150 acre threshold could also provide full buffer protection to some future murrelet habitat that develops in the RCR during the plan period. However, that will not be known until surveys are completed and occupied habitat is defined.

The potential removal of up to 200 acres of murrelet habitat buffer (only after the first 150 acres is conserved) could conceivably increase predation rates and expose nests to adverse wind impact for murrelets that may nest in those particular stands. Murrelet chicks or eggs could be affected by this potential habitat degradation, although the amount of total buffer habitat involved is relatively low. More importantly, adult murrelets are not expected to be directly lost by land management resulting from this plan, and minimization and mitigation measures that address the potential impacts to the buffer habitat are described in Section 7.3.2.1.

7.2.2.2 Bald Eagle

This plan will conserve all bald eagle nest sites within the HCP area. Additionally, it will lead to the development and implementation of a bald eagle management plan that will conserve the bald eagle roost site and staging areas in the North Fork Skokomish River valley. Bald eagles are not expected to be lost as a result of the implementation of the Plan, although some potential habitat loss and temporal management activity disturbances may affect bald eagles near or at the communal roost site. These disturbances could be in the form of: 1) temporal noise disturbances related to timber harvest or road building operations within 0.25 mile to 0.5 mile of the communal roost site or staging areas to that site; or 2) trees or stands of trees used for staging or roosting may be removed by timber harvesting or road building. In some, or possibly all instances, bald eagles may use other nearby trees for staging and roosting if some of that habitat is lost. The specific amount and level of these impacts is not currently known but is expected to be quite small. The permitted activities are not expected to cause any significant impact to the eagle population that nests in the Plan Area, or to the eagles that use the communal roost site and staging area. Mitigation and minimization measures for this potential impact are described in Section 7.3.2.2.

7.2.2.3 Band-tailed Pigeon

Simpson currently harvests coniferous forests at approximately 50-70 years of age. In future years of the plan this harvest age will typically occur between 40 and 50 years. On average, the annual harvest of timber in the Plan Area will occur on less than two percent of the land that has mature coniferous forest. Removal of mature forest habitat is not expected to directly injure or kill any pigeons, due to their ability to fly from management disturbances. This management may, however, incidentally remove some nesting habitat, nests, eggs, or chicks each year. Additionally, some incidental loss of foraging habitat could result from herbicide treatments placed on young clear-cut units that may have forage plant species. The potential habitat loss and herbicide spraying, however, is not expected to significantly impact the band-tailed population in the Plan Area. Mitigation and minimization measures that address these potential impacts are identified in Section 7.3.2.5.

7.2.2.4 Harlequin Duck

This plan is not expected to adversely impact harlequin duck populations. Habitat conservation measures, as defined for the RCR, will ensure that adequate nesting and aquatic habitats for this species are conserved and enhanced. Additionally, restrictions placed on potential management disturbances near nest sites will also help ensure this species is conserved in the HCP area.

7.2.2.5 Roosevelt Elk

Some Roosevelt elk may be adversely impacted as a result of implementing this plan; however, measures in this plan will help ensure these elk populations are sustained and enhanced in the Plan Area as a whole. Implementing the management prescriptions will impose no threat to the continued survival of this population in the wild or in the Plan Area.

7.2.2.6 Snag Dependent Species

Preliminary research in the HCP area indicates the quantity and quality of snags available for the snag dependent bird species are currently adequate to sustain those populations (refer to snag data description in Appendix E and species habitat requirements in Appendix A). Although implementation of this plan will result in some loss of nesting habitat, adult birds are not expected to be injured or killed due to their ability to fly from disturbances. Even though some habitat will be lost due to timber management activities, the amount of habitat lost is expected to be less than five percent of that which would be available in the HCP area during any given year of the plan. Additionally, this quantity of habitat loss is expected to be replaced, on average, during the plan period by snags that are conserved and developed in the RCR and forested wetlands and in upland forest stands that grow older and develop snag habitat. This long-term no-net-loss of habitat, albeit in variable locations, will help ensure there will be no significant detrimental impact to these species snag habitats in the HCP area. However, some species may experience population limitations in the Plan Area due to competition within and between species for snag habitats concentrated in the RCR and wetland conservation zones. Although this competition may limit some species populations from inhabiting all areas of the landscape, it is not expected to prevent any of the species covered by this plan from maintaining populations in the Plan Area. Specific measures that minimize and mitigate adverse impacts to these species are defined in Section 7.3.2.6

7.3 MINIMIZATION AND MITIGATION OF IMPACTS

7.3.1 Aquatic Species

The HCP prescriptions minimize to the greatest extent practicable the impacts of covered activities on the primary inputs and processes that are vital to the maintenance of productive stream habitat. For example, riparian prescriptions are designed to fully protect, with a no harvest buffer, those geomorphic surfaces that have the highest likelihood of contributing logs and woody debris to streams. Shade is likewise maintained at optimal levels, with special attention given to streams that may be susceptible to increases in water temperature due to loss of density in the canopy. The effects of road sedimentation are minimized through a suite of prescriptions designed to eliminate road surface erosion and make sure water is not concentrated in the ditch line. Destabilizing influences of road runoff on steep slopes have been minimized through prescriptions designed to prevent piracy and transfer of water between small basins. The road program will provide substantial mitigation in the form of culvert replacements that will eliminate long standing fish blockages and by decommissioning of road segments that are prone to causing landslides and debris flows. The impact of timber harvest on slope stability will be minimized through the identification of unstable areas and prohibitions on harvest or the maintenance of sufficient root reinforcement to avoid triggering shallow rapid landslides.

Taken together the management prescriptions set forth in Section 5 substantially minimize and mitigate the potential for the impacts and whatever minor amount of take may occur. In fact, the management prescriptions outlined in the HCP reduce the potential for incidental "take" to such a degree that it would be extremely difficult to measure. In any event, the impact of any such "take" should be of such a small consequence that the survival and recovery of the covered species in the wild should be unhindered by activities permitted by the HCP.

7.3.1.1 Headwater Species Association

Potential impacts to the headwater species association will be minimized by: 1) protecting unstable slopes with undisturbed no harvest continuous leave areas (Section 5.2.5), 2) constructing new roads to high standards so that fills will not fail and cause debris flows (Section 5.2.4.5), and 3) leaving discontinuous buffers to act as refugia in areas where no instability occurs in non-fish bearing channels (Section 5.2.1, Table 17). These complementary conservation practices will combine to maintain undisturbed adult terrestrial habitat, including seeps and springs, and functional breeding and larval rearing habitat in the steep headwater channels.

Mitigation of any incidental take will also be provided by the road decommissioning program (Section 5.2.4.2), which will address legacy roads. In the absence of this mitigation, road fills, especially in the CUP especially, would continue to fail, potentially destroying miles of high quality stream breeding amphibian habitat.

7.3.1.2 Steep Tributary Species Association

Impacts to members of the steep tributary species association will be minimized by implementing the RCR prescriptions which will leave substantial undisturbed buffers along channel classes supporting this group (Section 5.2.1, Table 17). Additionally, the requirements associated with unstable slopes will provide additional undisturbed buffers to ensure maintenance of riparian forest function and hill slope stability (Section 5.2.5). Special attention to the design of new roads will have a positive effect by reducing the risk for triggering landslides that typically propagate

through steep tributary systems (Section 5.2.4.5). At the small basin level, restriction of harvest rate in the CUP will minimize the possible impacts to habitat from peak flow increases (Section 5.2.6).

Mitigation for incidental take of members of this species association will also occur through the road decommissioning program (Section 5.2.4.2). In the absence of this work fill failures would continue to occur, impacting a substantial amount of steep tributary habitat.

7.3.1.3 Flat Tributary Species Association

Impacts to the members of the flat tributary species association will be minimized by implementing the RCR prescriptions which will leave substantial undisturbed buffers along all of the channel classes supporting this group (Section 5.2.1, Table 17). This will address the temperature issues through well shaded streams, provide sufficient woody debris recruitment for habitat structure, and also maintain roots in the stream banks to resist erosion. The reduction of sediment supply from headwater and steep tributary channel classes will provide additional minimization of impacts from permitted activities.

Mitigation of take for this species association will occur through replacing culverts to allow for fish passage where it is currently blocked (Section 5.2.4.2), conducting research on the addition of woody debris to streams with currently low wood loading (Section 5.2.7), and by keeping wood in the channel network that is removed from the entrances to culverts (Section 5.2.4.3, Table 17).

7.3.1.4 Mainstem Species Association

Impacts to the members of the mainstem species association will be minimized directly by implementing the RCR (Section 5.2.1) and unstable slopes prescriptions (Section 5.2.5). These two prescription categories will maintain slope stability and woody debris recruitment in the short term. In the long term, they are designed to leave timbered surfaces in place that are prone to failure and may deliver large quantities of logs to the main rivers.

7.3.1.5 Lentic Species Association

Impacts to members of the lentic species association will be minimized by implementing the RCR prescriptions (Section 5.2.3.1). These actions will provide undisturbed terrestrial habitat for adult pond breeding amphibians and provide structural elements for eventual recruitment to wetlands. Roads around wetlands will be maintained (Section 5.2.3.2) and constructed to prevent impacts to the stability of wetland water level and inflow, and minimize sediment runoff.

7.3.2 Wildlife Species

7.3.2.1 Marbled Murrelet

Potential management disturbances to murrelet nesting will be minimized with seasonal and daily limitations placed on those activities, and conservation of nesting habitat. Additionally, management under this plan will promote the development of future murrelet habitat in the RCR, which will be conserved for the duration of the plan period. Section 6.3.1 shows a conservative estimate of as much as 1,991 acres of additional murrelet habitat could be added to the Plan Area during the plan period. This increased acreage most likely also will lead to a net increase in the

number of murrelets nesting in the HCP area, thus mitigate any potential take that results from buffer management.

7.3.2.2 Bald Eagle

Simpson will minimize impacts to eagles by: 1) protecting all eagle nest sites when known; 2) protecting most, if not all existing perch sites along river and wetlands; 3) developing and implementing a communal roost site conservation plan in the North Fork Skokomish River drainage in conjunction with the WDFW. Additionally, Simpson will provide mitigation for bald eagle perching and nesting habitat that may be inadvertently lost by timber management activities. This mitigation will occur by establishing the RCR and the forested wetland conservation programs, which will lead to additional nesting and perching habitat development along or near rivers, streams and wetlands. These measures combined are expected to lead to a net increase in nesting and roosting habitat in the HCP area, and most likely a net increase in bald eagles using the HCP area, during the plan period.

7.3.2.3 Band-tailed Pigeon

The amount of take if any, that could occur to band-tailed pigeons as a result of herbicide spraying will be minimized as a result of measures in this plan (defined in Section 5.3.3). There most likely will not be a net decrease of nesting habitat over the plan period, therefor mitigation measures were not considered for nesting habitat losses. The potential for foraging habitat take resulting from herbicide spraying will be mitigated by the expected increased level of foraging habitat quantity and quality in the RCR and wetland conservation areas. These measures are expected to provide a net increase in habitat quality and quantity for this species as compared with timber management practices that would occur without this plan.

7.3.2.4 Harlequin Duck

Potential disturbances, or take, to the harlequin duck due to timber management operations will be minimized by placing operational restrictions around nest sites (as defined in Section 5.3.4). Some minor amounts of nesting habitat loss could occur to this species as a result of implementing this plan. Those potential losses will be mitigated by implementing the RCR strategy, which increases the amount of riparian and aquatic ecosystem protection on the river systems that these ducks typically inhabit. These measures are expected to provide a net increase in habitat quality and quantity for this species above that which would occur without this plan.

7.3.2.5 Roosevelt Elk

The road closure program defined in Section 5.3.5 will substantially minimize the potential take of this species resulting from temporal motor vehicle traffic disturbances. This measure alone will ensure the survival of this species in the HCP area because habitats are also adequate for their survival. However, in the event that there is some incidental loss to individual members of the population, Simpson will provide mitigation in the form of a forage seeding program, as defined in Section 5.3.5. These measures will help ensure there will be a net increase in habitat quality for elk during the plan period, as compared with management that would occur without the HCP.

7.3.2.6 Snag Dependent Species

Although a net decrease in habitat quality and quantity is not expected for the cavity nesting bird species, Simpson's RCR conservation program will minimize potential habitat losses, due to

timber management, by implementing the RCR program, wildlife tree conservation program, and the wetlands conservation program (Table 18). Additionally, Simpson will mitigate potential habitat losses caused by timber management by developing additional and larger snag habitat by conserving, for 50 years, at least 3.9 million mature trees in the Plan Area, which averages more than 18 trees for each acre of the Plan Area. These minimization and mitigation measures will help ensure these species habitats are maintained and enhanced in the Plan Area so that these species populations can survive and recover.

Table 18. Summary of potential habitat impacts, species take, and the net result of implementing the Simpson HCP for covered wildlife species.

Species	Potential Habitat Impacts	Potential Species Impacts	Net Impact with Implementation of Conservation Measures on Species
Marbled Murrelet	No loss of occupied habitat, potential disturbance of buffer in a low percentage of cases.	No loss of adults or young. Disturbance of some buffers could result in a slight increase predation or loss of chicks or eggs.	Net increase in nesting habitat availability and quality through the plan period. Population levels are expected to also increase through time.
Bald Eagle	No loss of nesting sites expected, or loss of communal roost site. Some potential loss (a few trees each year) of perch sites possible.	No loss of adults, young, chicks, or eggs.	Net increase in habitat quality and availability. Population levels are expected to increase as a result of this plan.
Harlequin duck	No direct impacts are expected to habitats, although some small scale indirect impacts may occur (e.g. reduced forest buffer of nest sites)	Very slight possibility of impact to eggs, chicks, or nests, however this potential will be substantially decreased with conservation measures.	A net increase in nesting, foraging and brood rearing habitat quality, and a net increase in nesting habitat. Population levels should not decline and potentially will increase.
Band-tailed pigeon	Limited area impact on forage producing shrubs by herbicide spraying. Nesting habitat availability will remain relatively consistent during HCP period.	No loss of adults or fledged young. A slight potential that loss of eggs and chicks could occur.	A net increase in forage habitat protection will occur. No net decrease in nesting habitat. Potential for a net increase in population levels due to increased forage habitat protection.
Roosevelt elk	Changing habitat availability resulting from harvest rotations, however quantity and quality will remain relatively consistent. Road closures will increase availability of habitat.	None	Moderate increase expected in habitat quantity and quality as a result of road closure program and forage seeding. Potential for increased population levels due to habitat enhancements.
Cavity Dependent Bird Species	No net loss of habitat is expected due to RCR, wildlife tree conservation, and wetlands conservation, although there will be changing habitat availability resulting from harvest rotations.	No adults or fledged young injured or lost, however a few eggs and chicks could be lost each year.	Small increase expected in habitat quantity and quality, resulting from RCR, wildlife leave tree and forested wetland conservation. Potential for net increase in population levels due to habitat enhancements.

8 IMPLEMENTATION MONITORING

8.1 PURPOSE

The purpose of Implementation Monitoring is to document Simpson's adherence to conditions of the HCP. This requirement will be accomplished through an operational tracking system based on aerial photos, field data and Simpson's GIS. The information to be developed is intended to be of sufficient detail and scope to permit the Services to confirm that Simpson's management of the Plan Area comports with the requirements of this HCP. *Implementation monitoring reports for each of the conservation programs will be available for agency review annually at the end of the first quarter of every calendar year.* In addition, Simpson will prepare 5-year reports and will conduct periodic surveys as discussed below.

8.2 ANNUAL IMPLEMENTATION MONITORING REPORTS

Annual implementation monitoring reports will include a description of the following:

8.2.1 Riparian Conservation Reserves

- Maps:
  Plan Area with all harvest units from preceding year identified.
  Unit level maps with details of channel class, RCR layout, and management key.
- Reports:
  Acres of RCR cover type by channel class and management treatment.

8.2.2 Wildlife Reserve Trees Outside the RCR

- Determine whether a minimum average of 8 trees per acre, greater than 7 inches DBH, will be maintained for each section of land in the Plan Area by year 10 of the plan, and continue for the remaining plan period.

8.2.3 Wetlands

- Maps:
  Unit level maps with detail of wetland features including forested wetlands, WMZ layout, by WMZ class, and management key.
- Reports:
  Acres of WMZ by wetland class and treatment, and forested wetland acres by treatment.

8.2.4 Road Management

- Maps:
  Roads inventoried and road remediation by type.
- Reports:
  Miles of road inventoried, dollars spent and amount of miles of work completed by road remediation type, including forage seeding.

8.2.5 Unstable Slopes

- Maps:
  Miles of road and maps of roads built on unstable slopes.
- Reports:
  Number of RCR acres by mass wasting or terrain units for total annual harvest area.
  Acres of unstable slopes harvested.

8.2.6 Hydrologic Maturity

- Percentage of each basin being managed for hydrologic maturity in mature, immature and intermediate hydrologic stand conditions.

8.2.7 Experimental Management

- Character of any such projects and their current status.

8.2.8 Supplemental Prescriptions

- Detailed description of specific supplemental prescriptions and maps of implementation areas.

8.2.9 Wildlife

- Results of all wildlife surveys done during the preceding year.
- Report documenting the extent of any herbicide application and also the areas specifically avoided for the purposes of compliance with Section 5.3.3.

8.2.10 Adaptive Management

- Adaptive management acreage account ("AMAA") balance.
- Description of where and for what purposes adaptive management acres were used.

8.3 FIVE-YEAR IMPLEMENTATION REPORTS

8.3.1 Vegetation Cover Types

- Every ten years, Simpson will update the estimates of vegetation cover types and ages in the RCR (established and planned).

8.3.2 Wetland Classification and Inventory

- At five and ten years from date of ITP signing, report of inventoried wetland acres by HGM class.
- Report of reference wetland monitoring work conducted.

9 RESOURCE MONITORING PROGRAM

9.1 GENERAL

Simpson will implement a resource assessment, monitoring and research program in order to assess progress being made in the Plan Area toward achieving the established resource objectives (Section 4). Specifically, such an assessment, monitoring and research program will :

1. Validate assumptions and associations in the underlying landscape and channel classification scheme;

2. Evaluate the physical and ecological outcome of Simpson's forest management activities on aquatic and riparian systems;

3. Determine trends in specific habitat conditions and the distribution or relative abundance of particular species; and.

4. Document criteria necessary for evaluating resource objectives.

Results of this work will be communicated to the Services and the other members of the Scientific Advisory Team ("SAT"), (Section 14) and will be used in determining if future adjustments to management prescriptions are appropriate pursuant to the adaptive management procedures described in Section 10. In addition to these elements of the monitoring program, Simpson will also conduct pre-harvest reviews and audits to ensure and assess implementation compliance with the management prescriptions then in effect under this Plan. The Implementation Monitoring Program is described in the previous Section 8.

9.2 PROGRAM APPROACH

An environmental field program with the broad purposes stated above will require projects and experiments to be conducted at different levels of detail and/or rigor. As established in this program, resource assessments, monitoring activities and research projects complement each other in addressing the effectiveness of management prescriptions and validating assumptions of the conservation program. Assessment level work will "set up" or develop topics so that they may be efficiently resolved through monitoring or research activities. Simpson expects that about 30, 40, and 30 percent, of the annual resource monitoring program will be expended on assessment, monitoring and research respectively. Table 19 specifically describes the complementary nature of the HCP resource-monitoring program. Some elements of this overall program can be classified as effectiveness, trend, baseline, validation, or compliance monitoring as defined by McDonald et. al. (1991). In the following subsections, specific questions are posed to help focus the monitoring and research components of the program.

9.2.1 Assessment

Assessment level work will focus on developing information useful in formulating hypotheses for testing in the more rigorous monitoring or research components of the program. Simpson will also use assessment level work to validate assumptions made in the landscape stratification and channel classification schemes and refine elements of the TMDL such as verification of historical

mass wasting rates for various channel classes (aerial photo interpretation). The methods generally employed for assessment level work will be designed to obtain information quickly and efficiently as a first priority. Assessment level work may also focus on new ideas or field problems for which no well established protocols exist or topics of general interest for which there is no need, or the nature of the problem prohibits highly accurate measurements.

Assessment level projects that Simpson currently is engaged in and will continue under the HCP include: 1) timber harvest unit operational reviews, 2) mapping channels and verifying the HCP landscape stratification and channel segment classification system, and 3) describing fish distribution using a variety of methods, including electro-fishing. All information obtained through the operational timber harvest unit reviews is stored in a stream segment relational database associated with Simpson's GIS. This database has been demonstrated to the Services, is updated regularly and will be the core repository for resource information collected during subsequent monitoring and research activities. As such this database will become a powerful tool in refining Simpson's understanding of resource conditions, trends and by inference, the effectiveness of management prescriptions.

Table 19. HCP Monitoring Program components, their primary areas of focus and relationship to each other.

ASSESSMENT	MONITORING	RESEARCH
Verifies baseline assumptions about the landscape stratification and channel classification scheme. *Validation Monitoring.* Provides broad overview of habitat conditions. Develops hypotheses for more rigorous testing through other monitoring or research components. Provides consultation services to timber harvest unit layout or logging operations.	Tests specific hypotheses with quantifiable, repeatable methods (conclusions may form the basis for initiating adaptive management discussions). *Effectiveness Monitoring*. Determines trends in habitat conditions or animal distribution or relative abundance. *Trend Monitoring.* Determine compliance with resource objectives and TMDL. *Compliance Monitoring.*	Develop baseline information necessary to test specific hypotheses (e.g. small basin hydrologic characteristics). *Baseline Monitoring.* Develop detailed information on special subjects where only speculative or conflicting data currently exist (e.g. interaction of management activities and triggering of deep-seated landslides within the inner gorges).

9.2.2 Monitoring

For the effectiveness element of the monitoring program to be successful as an informational feedback loop for management, it needs to be focused and produce specific information about the consequences of individual and collective forest management activities (this also holds true for other monitoring program elements). The only way to ensure this result is to enforce discipline on the monitoring program through specific questions and objectives. This is the most important step in formulating an effective water quality or habitat monitoring program (McDonald et. al. 1991) and unless this step is taken the monitoring program will be inefficient and ultimately inept in

answering management questions. Monitoring questions and objectives will be designed with regard to resource objectives or particular management prescriptions and linked to specific LTUs and channel classes or species as appropriate.

In general, monitoring program elements will be those for which relatively well established methods are available and the character of the problems under study is reasonably well known. Monitoring projects that Simpson is already engaged in and that will expand under the HCP monitoring program include: 1) amphibian distribution and relative abundance, 2) riparian forest conditions (including snag inventories), 3) in-channel habitat conditions, and 4) stream temperature. Data sets associated with monitoring will be derived using methods that are reproducible and that can be used to establish reliable baselines for determining trends. The database described above will help put these results into a spatial context for the entire Plan Area.

9.2.3 Research

Elements of the resource monitoring program that will be assigned to the research portion of the program will generally fall into two categories. 1) Those for which a particularly complex and long-term baseline is necessary for testing specific hypotheses (e.g. Simpson will implement in year one of the Plan Period a long term paired watershed study of hydrologic characteristics of small basins in the CUP). 2) Those for which detailed information on special subjects needs to be developed or where only speculative or conflicting data currently exist (e.g. interaction of management activities and triggering of deep seated landslides within inner gorges). All research projects will be focused by specific key questions.

9.3 LINKAGES BETWEEN MONITORING PROGRAM AND RESOURCE OBJECTIVES

The Resource Monitoring Program will provide information needed to determine whether or not progress is being made toward the achievement of resource objectives. In most, if not all cases, information needed to verify the attainment of resource objectives will come from multiple assessment, monitoring and research activities. In order to make good decisions regarding the resource objectives it will be necessary to look to more than one piece of evidence. For example, in determining if surface water temperatures are being maintained consistent with a naturally functioning landscape (Plan Area Aquatic Resource Objective No. 4, Section 4.4.1), it will be necessary to look to data derived through three components of the Resource Monitoring Program: temperature monitoring, riparian vegetation monitoring and in-channel habitat assessment. Table 20 provides a quick reference linking each resource objective with correlative monitoring program questions. (Reviewers are directed to Section 6, Table 12 for information on how the resource objectives link to the covered species.) With regard to aquatic habitat issues and species, understanding and accounting for the mechanisms and processes of wood, water, sediment and energy delivery to streams will be the primary focus of Simpson's Resource Monitoring Program. Measurement of in-channel habitat variables alone will be insufficient to evaluate the effectiveness of the management prescriptions. Figure 12 provides a stylized flow chart of the working relationship between resource objectives, the Resource Monitoring Program and adaptive management.

9.4 INITIAL MONITORING PROGRAM

Simpson has developed an initial Monitoring Program that is organized around the following Plan Area and LTU specific questions. Implicit in these questions are specific management issues that relate to the watershed inputs and processes necessary for healthy aquatic and riparian systems.

As the monitoring program matures, questions may be modified or replaced with new ones derived in consultation and coordination with the SAT.

Each monitoring or research question will be the basis for a workplan that will have multiple objectives and test hypotheses derived from the objectives. While the questions have been initially framed, the objectives and hypotheses for the Work Plans have not. During the first year of Plan implementation Simpson will continue to conduct the program elements described above (Sections 9.2.1and 9.2.2) and by year two the Resource Monitoring Program will be fully adapted to comply with the HCP requirements.

9.4.1 Plan Area Wide Monitoring Questions

The following four questions form the basis for Plan Area wide monitoring activities that will address riparian forest conditions, in-channel habitats, road surface erosion, mass wasting and stream temperatures.

1. *How do stand characteristics of the RCRs and the status of individual trees change over time?* (Rationale: To adequately evaluate the performance of the RCR in providing necessary stream functions and to determine how these stands are responding to adjacent land management, their character and condition must be tracked in detail through time.)

2. *How do in-channel habitat conditions compare to reference conditions, (either modeled or observed) and what is the distribution of those conditions by channel class?* (Rationale: Although in-channel habitat conditions are expected to vary considerably over time in response to natural climatic events, there is considerable interest in how these conditions compare to other systems or to expected conditions.)

3. *What is the relative contribution of natural and management related mass wasting and surface erosion from roads to the sediment supply in Plan Area streams?* (Rationale: Use of sediment budgets is a powerful technique in assessing the risk of management activities and focusing remedial work. Surface erosion from roads can be a significant source of fine sediment to stream channels but the coarse sediment fraction is also an important modifier of stream habitat.)

4. *How are management activities influencing surface water temperatures of Plan Area streams?* (Rationale: Broad environmental controls of different types exist on stream temperature across the Plan Area. Validation of this assertion and an appraisal of how each temperature regime responds to management activities is important to document.)

9.4.2 LTU Specific Monitoring Questions

The following fourteen questions form the basis for LTU specific aquatic monitoring activities that will address a variety of watershed and channel network processes and functions. The LTU specific monitoring activities will supplement the Plan Area wide monitoring work and contribute to the evaluation of particular management prescriptions as they function on specific landscapes.

9.4.2.1 Alpine Glacial (AGL)

5. *What is the role of roads in the interception of ground water and how does this process influence the hydrology of small basins?* (Rationale: Observations indicate shallow ground water is easily captured via the ditch system and rerouted from its normal down slope pathway,

dramatically altering the time it takes for precipitation to contribute to surface flow during winter.)

6. *Are some stream segments in the AGL-Qo6 and AGL-Qo7 channel class "disconnected" from historic floodplain surfaces? What caused this condition? What are the consequences for the present day channel and can anything be done to reverse this condition?* (Rationale: Observations indicate that some channel segments appear disconnected from apparent historic floodplain surfaces, functionally confining them between stream banks of resistant glacial till. Several possible causes for this condition exist, including aggressive stream clean out practices of the past. Regardless of the cause, full expression of habitat character in these channels is not possible without greater understanding and remedy of the situation.)

7. *What pathways of riparian forest succession developed in response to the initial timber harvest? Should anything be done to redirect those pathways, and what are the likely outcomes of this kind of ecological intervention?* (Rationale: Because topographic moisture gradients are severe in some riparian areas of the AGL, red alder has persisted after the first timber harvest and has suppressed conifer regeneration. The persistence of hardwood dominated riparian stands has implications for long term recruitment of woody debris input to streams. However, a significant amount of uncertainty exists regarding the outcome of silvicultural treatments and desired community structure in these settings. Simpson will evaluate options for accelerating conifer development in some areas where instream wood levels are particularly low.)

9.4.2.2 Crescent Islands (CIS)

8. *What pathways of riparian forest succession developed in response to the initial timber harvest? Should anything be done to redirect those pathways, and what are the likely outcomes of this kind of ecological intervention?* (Rationale: Because topographic moisture gradients are pronounced in some riparian areas of the CIS, mixed hardwood stands have persisted after the first timber harvest and have suppressed conifer regeneration. The persistence of hardwood dominated riparian stands has implications for long term recruitment of woody debris input to streams. However, a significant amount of uncertainty exists regarding the outcome of silvicultural treatments and desired community structure in these settings. Simpson will evaluate options for accelerating conifer development in some areas where instream wood levels are particularly low.)

9. *What are the consequences on fish distribution and sediment delivery to larger streams from using culverts for stream crossings in CIS-Qc1 and CIS-Qc2 channel segments?* (Rationale: Highly erodible channel bed and banks of unconsolidated sands and small gravels make it difficult to maintain passage through culverts in these channel segments over the long term. For permanent stream crossings, solutions need to be developed that avoid fish passage problems and the erosion of channel beds.)

10. *Is there an influence of forest land management on the depth of stream bed scour and bank erosion in pool riffle channels of the CIS?* (Rationale: These stream segments tend to be naturally sediment rich with easily mobilized channel beds and the natural distribution of channel bed scour depths could be susceptible to changes in sediment supply or discharge. These changes could affect the reproductive success of anadromous fish species.)

9.4.2.3 Crescent Uplands (CUP)

11. *What are the respective roles of sediment storage and sediment supply (in CUP/C1-4 channels) on the character of channel segments at the boundary zone between the ROP and the CUP (ROP-C7 segments)?* (Rationale: Both sediment supply and the character and spacing of the debris dams and other storage features in the steep channel network of the CUP can affect the routing of coarse sediment to alluvial fan channel segments downstream. Sediment dynamics in the CUP canyon channel segments and their contributing landscapes need to be related to channel conditions in downstream segments that support anadromous fish.)

12. *How does the rate and pattern of timber harvest and road density affect small basin hydrology?* (Rationale: Changes in the hydrologic cycle associated with snow melt runoff could adversely affect the character of stream breeding amphibian and resident fish habitat and transmit effects to downstream segments that support anadromous fish.)

9.4.2.4 Recessional Outwash Plain (ROP)

13. *Are some stream segments in the ROP-Qc3 channel class "disconnected" from historic floodplain surfaces? What caused this condition? What are the consequences for the present day channel and can anything be done to reverse this condition?* (Rationale: Observations indicate that some channel segments appear disconnected from apparently historic floodplain surfaces functionally confining them between stream banks. Several possible causes for this condition exist, including aggressive stream clean out practices of the past. Regardless of the cause, full expression of habitat character in these channels is not possible without greater understanding and remedy of the situation.)

14. *How are forest management activities affecting surface water temperatures at the segment and the sub-basin level in streams of the ROP?* (Rationale: Data suggest small streams in the ROP may be especially susceptible to increases in temperature due to a loss of shade from riparian canopy. Wetlands and beaver ponds exert unknown influences that may alter surface water temperatures through multiple processes.)

15. *Are forest management activities adversely affecting the functional integrity of wetlands?* (Rationale: Many high quality wetlands exist in the ROP and more information is needed on how forest management may affect wetland character and function over the long term.)

9.4.2.5 Sedimentary Inner Gorges (SIG)

16. *What is the extent and distribution of bedrock channel segments and what are the causal links to forest management activities?* (Rationale: There is a loss of alluvial cover (gravel substrate) in some channels of the SIG that may affect their long term productivity for anadromous and resident fishes.)

17. *What is the contribution and fate of sediment derived from side slope failures along small streams in the SIG and are they triggered by management activities?* (Rationale: Observations indicate that there are a large number of relatively small failures on the side slopes of small streams in the SIG. It is important to understand the role, if any, that forest management activities may play in triggering these events.)

18. *What are the local and systemic effects of sediments derived from inner gorge failures (shallow rapid, deep seated, and chronic erosion of inner gorge side slopes) within the overall sediment budget of the SIG and do forest management activities trigger these failures?*

(Rationale: Qualitative observations indicate there is a marked delivery of sediment from inner gorge surfaces that may overwhelm contributions from other sources. This sediment may have severe impact on the suitability of habitat for large salmonids and other species. It is important to understand the role, if any, that forest management activities may play in triggering events that supply these sediments.)

9.4.3 Wildlife Monitoring Questions (Plan Area)

19. *How will bull trout be distributed in the Plan Area at year 10, 20, 30, and 40 relative to a baseline established by year 5 of the Plan?* The initial surveys, which will be done according to USFWS endorsed protocols, will establish the basis for subsequent monitoring efforts, the goal of which is to track how well bull trout are maintained across the landscape under HCP management. If subsequent monitoring documents a reduction in the range of bull trout, adaptive management discussions will be initiated. (Rationale: Bull trout distribution is currently not well described for the Plan Area and must be established in order to monitor the response of this species to HCP management.)

20. *Will the relative abundance and distribution of stream breeding amphibians change under HCP management?* If there is a significant decline in relative abundance or distribution such that on average they are half as numerous or such that their range is reduced by half of the baseline, (established by before and after study) adaptive management discussions will be initiated. Checkpoints for evaluating these data will occur at years 10, 20, 30 and 40. (Rationale: Management of headwater streams for the maintenance of stream breeding amphibian populations is unproven and must be monitored to demonstrate the response of these animals to HCP management.)

21. *What will the relative abundance and distribution of riverine breeding western toads be at years 10, 20, 30 and 40 of the Plan relative to a baseline established by year 5?* If there is a significant decline in relative abundance or distribution such that on average they are half as numerous or such that their range is reduced by half of the baseline, adaptive management discussions will be initiated. (Rationale: Western toads have declined throughout much of their range in western North America and no continuous long term monitoring data exists. The Plan Area supports populations of riverine breeding western toads for which 4 years of data already exist. The trend of these populations needs to be tracked through time to evaluate this species response to HCP management.)

22. *Will snag density in the RCR meet or exceed 2 snags 12- 24" DBH and 2 snags > 24" at years 20 and 40 of the Plan?* Baseline data will be collected in accordance the schedule in Table 21 and if it does not meet the above referenced targets, adaptive management discussions will be initiated. (Rationale: Maintenance of habitat for covered snag dependent bird species depends on the density of snags of particular size and character.)

9.5 ONGOING RESOURCE MONITORING PROGRAM

On an annual basis, Simpson will propose to the scientific advisory team (described in Section 14 below) and the Services an annual monitoring program (with related work plans). Simpson's proposal will generally follow the approach outlined above and, initially, will be designed to respond to some or all of the key questions identified above (Table 20). The Services and Simpson will confer in good faith regarding any changes which the Services may request be made to the Simpson's proposed monitoring work plans. Input from the scientific advisory team will

also be sought. If Simpson and the Services are unable to agree to a proposed annual monitoring program, Simpson will implement the program as required by the Services subject to the limitations set forth in Section 9.6 below.

9.6 LIMITATIONS ON RESOURCE MONITORING PROGRAM

Notwithstanding anything in this Section 9 to the contrary, in no event will Simpson be required to expend more than the annual monitoring cap (plus any available carry-over amount from the two immediately preceding plan years) to design, discuss and implement an effectiveness monitoring program (including the assessment, monitoring and research components of such a program). The annual monitoring cap will be an amount (expressed in constant 1999 dollars) equal to the sum of $275,000 plus $.50 for each acre added to the Plan Area after the date on which the ITP is first issued. If in any year, the amount of the annual monitoring cap exceeds the amount expended and charged against such cap, the excess amount may be carried forward for up to two years. All amounts expended for monitoring will be charged to carry-over amounts (starting with the earliest year and continuing forward) before being charged against the annual monitoring cap for the year in which such amounts are expended. Expenses to be charged against the monitoring cap include wages, benefits and allocated overhead for Simpson employees performing monitoring work (pro rated based on time if such employees work less than full time on such endeavors) and all out of pocket expenses incurred in connection with such monitoring work, including without limitation, the costs of consultants, experts and independent contractors. "Opportunity costs" (e.g. forgone revenues associated with trees retained to create specific treatment effects for evaluation in a monitoring program) will not be charged against the cap nor will any costs incurred in connection with Implementation Monitoring (described in preceding Section 8).

The schedule for the initial monitoring program is attached hereto as Table 21. While detailed Work Plans are to be developed on an annual basis as provided in Section 9.5 above, Simpson has made certain rough estimates of the anticipated scope and costs of the initial proposed monitoring program and believes that the program can be implemented approximately in accordance with the schedule set forth below for amounts not likely to exceed the annual monitoring cap.

Figure 12. Flow chart of resource monitoring program and adaptive management.

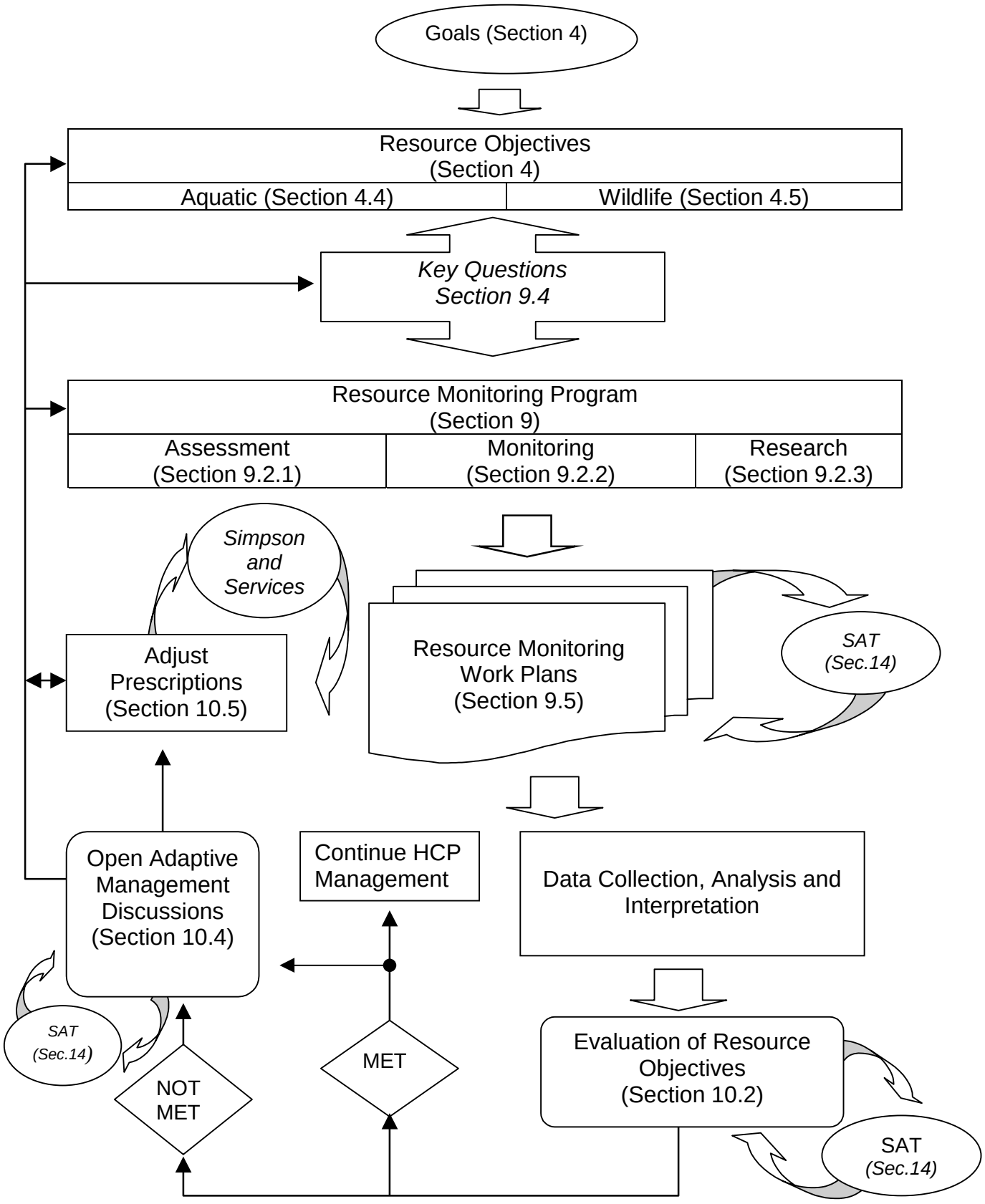

Table 20. Linkages between the Resource Objectives and the Monitoring and Research Program activities identified in Sections 9.2.1 and 9.2.2 and key questions identified in Sections 9.4.1 and 9.4.2.

Resource Objective (see Section 4)	Assessment, Monitoring, and Research Activities and Key Questions
Plan Area No. 1. Riparian forest conditions…	Monitoring element No. 2; Plan Area key question No. 1; LTU specific key questions No. 7 and 8; Wildlife key question No. 19 and 24.
Plan Area No. 2. Hydrologic processes…	Monitoring element No. 3; Plan Area key question No. 2; LTU specific key questions No. 5 and 12.
Plan Area No. 3. Mass wasting and sediment supply…	Monitoring element No. 3; Plan Area key question No. 2 and 3; LTU specific key questions No. 11, 17, and 18.
Plan Area No. 4. Stream temperature…	Monitoring element No. 3 and 4; Plan Area key question No. 1, 3 and 4; LTU specific key question No. 14 and 18.
AGL No. 1. Subsurface flow pathways…	Monitoring element No. 3; Plan Area key question No.2; LTU specific key questions No. 5.
AGL No. 2. Reconnect channels with floodplain…	Monitoring element No. 3; Plan Area key question No. 2; LTU specific key questions No. 6.
AGL No. 3. Accelerate riparian conifer development…	Monitoring element No. 2; Plan Area key question No. 1; LTU specific key question No. 7.
CIS No. 4. Accelerate riparian conifer development…	Monitoring element No. 2; Plan Area key question No. 1; LTU specific key question No. 8.
CIS No. 5. Replace culverts…	Assessment element No. 1, 2 and 3; LTU specific key question No. 9
CIS No. 6. Scour and fill…	Monitoring element No. 3; Plan Area key question No. 2; LTU specific key question No. 10.
CUP No. 7. Sediment supply, storage, transport…	Monitoring element No. 2 and 3; Plan Area key question No. 2; LTU specific key question No. 11.
CUP No. 8. Rain on snow…	Monitoring element No. 3; Plan Area key question No. 2; LTU specific key question No. 12.
ROP No. 9. Reconnect channels with floodplain…	Monitoring element No. 3; Plan Area key question No. 2; LTU specific key questions No. 13.
ROP No. 10. Elevated water temperature…	Monitoring element No. 2, 3, and 4; Plan Area key question No. 4; LTU specific key question No. 14.
ROP No. 11. Functional integrity of wetlands…	Monitoring element No. 2; Plan Area key question No. 1 and 3; LTU specific key question No. 15.
SIG No. 12. Alluvial cover over bedrock in channels…	Assessment element No. 2; Monitoring element No. 3; Plan Area key question No. 2 and 3; LTU specific key question No. 16.
SIG No. 13. Sediment supply small channels…	Monitoring element No. 3; Plan Area key question No. 2 and 3; LTU specific key question No. 17.
SIG No. 14. Inner gorge mass wasting…	Monitoring element No. 3; Plan Area key question No. 2 and 3; LTU specific key question No. 18.
Species specific: Bull trout distribution…	Assessment element No. 2 and 3; Monitoring element No. 3 and 4, Wildlife key question No. 19.
Species specific: Stream breeding amphibians…	Monitoring element No. 1, Wildlife key question No. 20.
Species specific: Western toad…	Monitoring element No. 1, Wildlife key question No. 21.
Species specific: Snag dependent birds…	Monitoring element No. 2; Plan Area key question No. 1; Wildlife key questions No. 19, 20, 21, and 24, Wildlife key question No. 22.
Other covered species…	Implementation monitoring (Section 8)

Table 21. Identification of monitoring program.
Work for the initial 10 years of the Habitat Monitoring Program are specified below (shading = report; X = data collection).

RESOURCE MONITORING PROGRAM	***HCP PLAN YEAR***[18]									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ASSESSMENT ELEMENTS (SECTION 9.2.1)										
1. Timber unit operational review	X	X	X	X	X	X	X	X	X	X
2. Channel mapping and channel class verification	X	X	X	X	X	X	X	X	X	X
3. Fish distribution	X	X	X	X	X	X	X	X	X	X
MONITORING ELEMENTS (SECTION 9.2.2)										
1. Amphibian distribution and relative abundance	X	X	X	X	X	X	X	X	X	X
2. Riparian forest condition		X	X					X	X	
3. In-channel habitat conditions	X	X		X	X					
4. Stream Temperatures	X	X	X	X	X	X	X	X	X	X
KEY QUESTIONS (SECTIONS 9.4.1 AND 9.4.2)										
Plan area wide No. 1 Riparian condition…		X	X					X	X	
Plan area wide No. 2 In-channel conditions…		X	X	X	X		X	X	X	X
Plan area wide No. 3 Sediment supply…		X	X	X	X		X	X	X	X
Plan area wide No. 4 Water temperatures…	X	X	X	X	X	X	X	X	X	X
AGL 5. Hydrology and roads…	X	X	X	X						
AGL 6. Floodplain connectivity…			X	X						
AGL 7. Riparian forest succession…		X	X					X	X	
CIS 8. Riparian forest succession…		X	X					X	X	
CIS 9. Culverts and fish distribution…	X	X	X	X	X	X	X	X	X	X
CIS 10. Depth and pattern of scour…			X	X	X	X	X	X	X	X
CUP 11. Sediment storage and supply…	X	X	X	X	X					
CUP 12. Rain on snow…	X	X	X	X	X	X	X	X	X	X
ROP 13. Floodplain connectivity…		X	X							
ROP 14. Water temperatures in ROP…	X	X	X	X	X	X	X	X	X	X
ROP 15. Functional integrity of wetlands…		X	X	X	X	X	X	X	X	X
SIG 16. Alluvial cover in bedrock channels…		X								X
SIG 17. Side slope instability in small channels…	X	X		X	X	X	X	X	X	X
SIG 18. Inner gorge instability in large channels	X	X		X	X	X	X	X	X	X
Wildlife 19. Bull trout distribution…	X	X	X	X	X				X	X
Wildlife 20. Stream breeding amphibians…	X	X	X	X	X	X	X	X	X	X
Wildlife 21. Western toads…	X	X	X	X	X	X	X	X	X	X
Wildlife 22. Snag dependent birds…				X					X	

[18] The monitoring and research program will run continuously for the plan period, only the first 10 years of the program are shown here. The program will receive comprehensive review and may be adjusted at the end of Year Ten. Each year the program will be reviewed by the SAT (Section 14).

10 ADAPTIVE MANAGEMENT

10.1 GENERAL

Simpson expects the understanding of watershed processes, natural disturbance rates and patterns, riparian forest functions, and the effects of its management practices on aquatic and riparian systems to mature over the life of the plan. As a consequence of this new knowledge, Simpson may learn how to better or more efficiently mitigate the effects of forest management activities on covered species and aquatic resources. For example, it may be demonstrated through the research and monitoring program that optimal fish production occurs with buffers that are designed to allow some light penetration instead of complete shade and that this same treatment creates a structurally diverse riparian canopy that is beneficial for wildlife. If this were to be the case, this information could be used to redesign riparian leave areas where appropriate.

10.2 RELATION OF MONITORING AND RESEARCH TO ADAPTIVE MANAGEMENT

Each of the questions identified in Section 9 (or to be developed in accordance with Section 9 thereafter) may be reduced to a suite of testable hypotheses. These hypotheses will constitute the principal suppositions about the form and function of watershed and riparian processes that are most likely to be affected by forest management activities and that relate directly to the attainment of resource objectives addressed by this Plan. As described in Section 9, the testing of these hypotheses constitutes a major portion of Simpson's Resource Monitoring Program and the results will be the direct link to adaptive management.

10.3 SUBJECTS AND SCHEDULE FOR ADJUSTMENT TO PRESCRIPTIONS

Management prescriptions will be subject to adaptive management only in accordance with this Section 10. Since physical and biological responses to different management activities are temporally variable, it makes sense to develop flexible schedules for opening adaptive management discussions for different subjects. Requests by Simpson or the Services to adjust any of the prescriptions will only be considered following the completion of the related monitoring and research work in accordance with Section 10.4. However, it is expected that such information should generally be available and sufficiently developed by times indicated in Table 22.

10.4 THRESHOLD TRIGGERS FOR OPENING ADAPTIVE MANAGEMENT DISCUSSIONS

The threshold for initiating adaptive management discussions will be tied to either the rejection or the acceptance (failure to reject), of one or more testable hypotheses associated with a particular resource objective. For example, if a hypothesis were established to the effect that a particular set of management prescriptions currently required in this HCP was sufficient to achieve a particular resource objective (Section 4), and if monitoring or research demonstrated that the hypothesis should be rejected, a discussion of the changes that might be made in these management prescriptions could be initiated by either Simpson or the Services. Conversely, if a hypothesis were established to the effect that a less restrictive set of prescriptions than are currently required for in this HCP would nonetheless be sufficient to achieve a particular resource objective, and if monitoring or research demonstrated that the hypothesis could not be rejected, a discussion of

possible ways to loosen the existing restrictions could be initiated by either Simpson or the Services. Upon the initiation of any adaptive management discussions, the scientific advisory team (Section 14) will be contacted and provided with the proposed revisions to prescriptions and the information which may bear on such modification. Simpson and the Services will consider the input of the scientific advisory team in good faith when deciding whether or not to implement any adaptive management changes.

Where the monitoring program establishes that the resource objectives (Section 4) are not being achieved, (or conversely, that the existing prescriptions could be relaxed and still achieve the desired outcomes) discussion will be initiated with the Services to address possible cause and effect relationships that could be responsible for the monitoring observations. This step is necessary because the attainment of any of the resource objectives depends not only on a suite of complementary management prescriptions, but also on the interaction of the present landscape with natural events and forest practice legacy factors. It will be necessary to determine which of the prescriptions or other factors are producing the observed results before any such prescription is adjusted.

Subject to the limitations set forth in Section 10.5 of this HCP, when monitoring and research demonstrates that resource objectives are not being met and that changes in management prescriptions are necessary to achieve them, or, alternatively, when the monitoring and research program demonstrates that resource objectives could be met with relaxed prescriptions, such management prescriptions will be adjusted to the satisfaction of Simpson and the Services.

Table 22. Schedule for opening adaptive management discussions based on specific management prescriptions or resource objectives.

Management Prescription or Resource Objective	Earliest Opening Date
Riparian Conservation Reserves (5.2.1) (Temperature function only)	Year 5
Riparian Conservation Reserves (5.2.1) (All other riparian forest functions)	Year 15
Supplemental Wildlife Tree Conservation (5.2.2)	Year 20
Wetlands Protection (5.2.3.2)	Year 15
Road Remediation (5.2.4.2)	Year 10
Road Maintenance (5.2.4.3)	Year 10
Road Use (5.2.4.4)	Year 10
New Road Location, Design and Construction (5.2.4.5)	Year 10
Unstable Slopes Management (5.2.5)	Year 20
Hydrologic Maturity (5.2.6)	Year 18
Other management prescriptions not specifically referenced	Year 10
Snag development (4.5.1)	Year 20
Bull trout distribution (4.5.1)	Year 10
Stream breeding amphibians (4.5.1)	Year 10
Western toad (4.5.1)	Year 10
Other wildlife species (4.5.1)	Year 20
Other resource objectives not specifically referenced (4.5.2)	Year 10

10.5 LIMITS TO PRESCRIPTION ADJUSTMENTS

Adaptive management changes required pursuant to Section 10 would be limited as follows:

10.5.1 Changes to Road-related Prescriptions

Adaptive management may be used to adjust priorities and methods for effecting road management activities as specified in Section 5.2.5. In no event, however, will Simpson be required to expend more than the maximum annual amounts set forth in Section 5.2.5.2.

10.5.2 Changes to Number of Restricted Acres

10.5.2.1 The AMAA Account

Starting at the time of issuance of the initial ITP, an Adaptive Management Acreage Account (AMAA) will be set up. Simpson will be deemed to have "deposited" an initial credit of 920 acres to the AMAA. The AMAA will then be either drawn down (an "AMAA debit") or increased (an "AMAA credit") based in each case on changes in the total acres in the Plan Area, on changes made through adaptive management in the number of acres subject to timber harvest restrictions or on changes in wildlife leave tree restrictions. Specifically, an AMAA debit will be made to the account: (a) on a one for one basis for each additional Restricted Acre added through adaptive management; (b) on a basis of one acre for 160 stems for additional wildlife leave trees required to be left; and (c) on a basis of .0035 acres to one for each acre deleted from the Plan Area. An AMAA credit will be made to the account: (a) on a one for one basis for each Restricted Acre removed through adaptive management; (b) on a basis of one acre for each 160 stems of wildlife leave trees no longer required to be left; and (c) on a basis of .0035 acres to one for each acre added to the Plan Area. A "Restricted Acre" is any acre in the Plan Area that at the time of harvest is subject to complete or partial restrictions on harvest (e.g. acres contained within a riparian management zone and a harvest unit).[19]

A cap of 920 acres was established for the AMAA. This cap was subjected to an analysis, the details of which follow, in order to determine how appropriate it might be, given uncertainties involved in some HCP prescriptions.

A group of channel classes was identified by Simpson and NMFS staff where there was some uncertainty about the full attainment of riparian function under highly variable environmental conditions. This identification was based on a familiarity with the channel classes in question, (including site visits and field reviews, baseline data evaluation and the technical analysis of certain riparian functions as supplied through information in Appendix G). For purposes of this analysis and for those channel classes identified, the buffer widths were increased by 50% to accommodate hypothesized future adaptive management needs. The resulting acreage was computed based on the number of miles in those channel classes and the anticipated increase in buffer width. After further review of the information and refinement of initial questions regarding the level of uncertainty, this acreage figure was adjusted to 920 acres.

[19] If the only restrictions on harvest are requirements to leave wildlife reserve trees, these acres will not constitute "Restricted Acres" and adjustments to the AMAA for changes in these requirements will be determined as provided in Section 10.5.2.4 below.

For many other channel classes, the riparian buffers and riparian strategies appear to be sufficient for maintaining and developing complete riparian functions. Where the confidence is high that functional needs will be met, it may be that the plan's prescriptions could be adjusted through the monitoring and adaptive management process, to provide acres of habitat in the future. Were this to happen, a corresponding additional "deposit" would be made to the AMAA account making those acres available for adaptive management purposes. In an effort to proceed conservatively, however, the possibility of such a future deposit was not considered in analyzing the appropriate size of the AMAA cap.

Since the primary benefits to many of the terrestrial species covered in this HCP accrue from minimization and mitigation measures associated with riparian prescriptions and guidelines, the analysis of the AMAA cap is considered to account for those species as well. The adaptive management process clearly envisions providing additional wildlife leave trees should that become necessary and there is a special accounting process to accommodate such changes without undo reductions to the number of acres credited to the AMAA (see Section 10.5.2.4). In these cases, instead of debiting the AMAA by the actual number of acres that would be necessary at that specific location to account for the required number of trees, the AMAA will be debited on a prorata basis of 160 trees per acre (number of acres to debit = required trees divided by 160).

10.5.2.2 Limits on Acreage Changes in General

No adaptive management changes will be allowed that will result in AMAA debits that would cause a deficit (negative) balance in the AMAA. All AMAA credits and debits attributable to the addition or removal of Restricted Acres will be taken at time of harvest of such acreage. All AMAA credits and debits attributable to changes in the total acreage of the Plan Area will be taken at the time the acres are added or deleted. Simpson will provide the Services with an annual statement of the number of acres remaining in the AMAA and an accounting for any changes made since the preceding annual report.

10.5.2.3 Changes in Number of Restricted Acres

AMAA debits and credits will occur through any adaptive management changes in riparian management prescriptions, wetland conservation prescriptions, or wildlife tree conservation prescriptions that either add additional acres subject to harvest restrictions (debits) or reduce the number of acres subject to harvest restrictions (credits) beyond the numbers of acres restricted at the time the change is made. For example, if through adaptive management, the riparian management area for the CUP-C2 channel class was changed from 25 meters to 35 meters, Simpson's harvest of a unit with 2,000 feet of CUP-C2 channel class would result in an AMAA debit of 1.50 acres (10 meter x 2,000 feet).[20] Although the adaptive management change would tentatively apply to all CUP-C2 channel classes, the AMAA debit would only be that calculated in respect of CUP-C2 channels at the time such channels were actually included in harvest units. If at the time of harvest of another unit containing a CUP-C2 channel the AMAA account had already been exhausted, the adaptive management change (i.e. increasing the riparian management area to 35 meters) would not be applied in the new unit.

Any changes to harvest prescriptions within an existing designated managed zone of a riparian management area or other changes to operations will not cause an adjustment to the AMAA (e.g.,

[20] Likewise if through adaptive management, the riparian management area for the CUP-C2 channel class was changed from 25 meters to 15 meters, Simpson's harvest of a unit with 2,000 feet of CUP-C2 channel class would result in an AMAA credit of 1.50 acres (10 meter x 2,000 feet).

a change to the 150 square feet basal area/40% tree removal managed zone prescription). Such changes would not increase the number of "Restricted Acres." Similarly, any partial harvest prescription applied to a previously unencumbered acre (i.e., an acre that is not a Restricted Acre since complete harvest is allowed) will be debited against the AMAA on a one to one basis and not prorated based on the extent of the harvest prescription. For example, if the basal area and partial tree removal management prescription were to be extended out an additional 30 meters from the current management zone for a harvest unit with 2,000 feet of CUP-C2 channel, the AMAA would be debited 4.50 acres (30 meters x 2,000 feet).

Acres of unstable slopes that, in accordance with this Plan, are to be identified for the first time after the date on which the ITP is initially issued (and thereby subjected to the related set of harvest prescriptions) will not be charged against the AMAA cap. For purposes of this Section 10.5, such unstable slope acres will be deemed to have been subject to the harvest prescriptions from the beginning of the Plan. Future "buffering" requirements or changes in boundary lines of such slope areas as determined through the adaptive management process, however, would be charged against the AMAA. Similarly, changes in the number of Restricted Acres that result from changes in stream or wetland classifications made to correct initial erroneous classifications will not be charged against the AMAA. For purposes of this Section 10.5, all streams and wetlands will be deemed to have been properly classified from the beginning of the Plan.

10.5.2.4 Changes in leave tree prescriptions

If the number of required wildlife leave trees is increased or decreased pursuant to adaptive management, corresponding debits or credits will be made to AMAA. For example, if adaptive management called for the leave tree prescription to increase from 8 trees/acre to 12 trees per acre in a harvest unit, the AMAA debits would be determined based upon a ratio of 160 trees/acre, e.g., 2.50 additional acres would be the required debit to the AMAA for a 100 acre harvest unit where adaptive management required 12 trees per acre instead of 8 (4 x 100/160 = 2.5).

11 IMPLEMENTATION

Implementation of the HCP will be governed by an agreement between Simpson and the Services and funded by Simpson as part of its ongoing operations in the Plan Area. The IA defines the role and responsibilities of the parties and provides a common understanding of actions that will be taken. In the event of any direct contradiction between the terms of the IA and of this HCP, the IA shall govern.

Simpson routinely carries approximately two years of harvest units under permit from the Washington Department of Natural Resources. The riparian boundaries and cutting lines of these harvest units are marked in the field according to current Washington State forest practices rules. Simpson reserves the right to harvest all units during the first 12 months after the ITP is initially issued under existing regulations and as marked in the field. Within 12 months of the issuance of the initial ITP all harvest units will be in full compliance with the terms of this HCP. During this twelve-month phase in period, Simpson will avoid the take of any listed species due to its operations.

12 ADDITION AND DELETION OF LAND FROM THE PLAN AREA

12.1 GENERAL

The IA sets forth the specific terms and conditions for the addition and deletion of land to and from the Plan Area. Under certain circumstances, Simpson has retained the right to effect such changes to the Plan Area land base without further consent or approval by the Services. In other instances, such changes must be processed as amendments to the plan and will require the Services' consent. Under some circumstances, changes to the Plan Area will not be made without first providing an opportunity for further public comment. This Section 12 provides a general summary of Simpson's rights to make changes to the Plan Area without further consent and contains an explanation of why the exercise of such rights is consistent with the plan's resource objectives.

Simpson reserves the right to withdraw up to 39,200 acres from the Plan Area over the life of the plan (other than acres in certain defined "core areas" identified in Section 12.3 and the IA). Simpson also reserves the right to add certain lands within the boundary area in Figure 1 which are not initially included in the Plan Area. These rights are reserved as a necessary means of maintaining flexibility to leverage land acquisitions that are important to Simpson in maintaining a competitive position in supplying logs to its manufacturing facilities in the vicinity of Shelton, WA.

12.2 ADDITION OF LAND

Simpson believes that it is likely that it will want to add lands to the Plan Area over the term of the HCP. While most of the lands Simpson currently owns in the Southwest region of Washington are included in the initial Plan Area, Simpson believes that it is likely that it will acquire other lands in this region which are similar in character to the lands initially included in the Plan Area and that it may wish to include such lands in the Plan Area.

Simpson will be entitled to add such lands as long as they have been managed by Simpson under the prescriptions set forth in this plan at all times after the later of the first anniversary of the day on which the ITP is issued or the date such lands are acquired by Simpson. In order to include such lands, Simpson will be required to provide certain baseline data to the Services together with an analysis demonstrating that the net effect and level of take on Covered Species on the land proposed for addition will not be significantly different than that analyzed by the Services in approving the HCP and issuing the ITP for the initial Plan Area. Since such lands will be "similar in character" and since they will have been managed in accordance with the plan prescriptions, fish and wildlife inhabiting such lands will have enjoyed similar benefits to those enjoyed by fish and wildlife using areas included within the initial plan boundaries.

At any time during the term of the Plan, with the consent of the Services, Simpson may add other lands to the Plan Area. The procedures for addressing such additions is set forth in the IA.

12.3 DELETION OF LAND

Even though there are currently no plans to sell or trade any lands within the Plan Area, it could be important for Simpson to be able to transfer some portion of its property base at some time in

the future. Simpson reserves the right to unilaterally remove up to 39,200 acres over the life of the plan. This right is limited, however, to areas outside of the "core areas." Certain portions of the Plan Area are likely to be more instrumental than others in achieving the plan's resource objectives and promoting the welfare of particular species. Simpson and the Services consider the following areas (the "core areas") to be of particular importance in this regard:

1. The seven sub-basins in the CUP identified in Table 5 and shown in Figure 7.

2. LFRs identified in Figure 8.

3. Lands within the Stillwater wetland emphasis area, Figure 13.

4. Mainstem corridors of the Wynoochee, West Fork and Middle Fork Satsop, and Canyon Rivers not included in the LFRs.[21]

Because the plan functions on a segment-by-segment basis for riparian areas, the removal of any particular segments outside the core areas should not significantly affect the efficacy of the plan over the balance of the Plan Area. Of course, any land removed from the plan would no longer enjoy the benefits of the ITP and all operations on the removed parcels would be subject to the effect of the ESA, and all other applicable federal and state statutes, rules and regulations governing forest practices.

[21] Lands adjacent to the Wynoochee River from Big Creek to the confluence of the unnamed right bank tributary in the south ½ of section 35 of T 21 N, R 8 W; lands adjacent to the West Fork Satsop River from the USFS boundary to Black Creek; lands adjacent to the Canyon River from the USFS boundary to the confluence with the West Fork Satsop River; and the Middle Fork Satsop River from the USFS boundary to the confluence of the unnamed left bank tributary in the NE 1/4 of section 26 of T 20 N, R 7 W. Adjacent in this context is defined as two site potential tree heights.

Figure 13. Map of the Stillwater wetland emphasis area

Note: this figure is available for viewing as a separate file

13 ALTERNATIVE MANAGEMENT

13.1 ALTERNATIVES CONSIDERED

Five alternative management strategies were considered for managing the Action Area, as described in Table 23. These five alternatives represent the reasonable range of management strategies available to Simpson for their forestland enterprises.

Table 23. Alternative management strategies considered for the Action Area.

Alternative	Title	Brief Description of Alternative
1	No Action	This management would be the same or similar as Simpson's current forest practices, as directed by the Washington Forest Practices Rules (WFPR) and Simpson's land management policies. The WFPR most likely would be modified in the future, just as in the past. Future WFPR changes may include provisions of the 1999 TFW Forestry Module (Alternative 2) or other provisions resulting from the TFW negotiations. Future changes to the WFPR could not be included in the No Action Alternative because they have not yet been promulgated as State law and the final rule language is speculative.
2	State Forestry Regulations with "Forestry Module" Provisions	Management would follow current Forest Practice Rules with the addition of the TFW Forestry Module (January 1999 version), which would include new standards for riparian, unstable slopes, and road management. An HCP would be implemented only for fish species, and an ITP would be issued those species.
3	Proposed Action - Simpson Habitat Conservation Plan	Management would follow prescriptions identified in the Simpson Timber Company Draft Habitat Conservation Plan (HCP) for fish and wildlife species in the 261,575 acre Action Area, and an ITP would be issued for those species.
4	Modified Northwest Forest Plan	Management would follow a modified version of the Northwest Forest Plan (NWFP) which would provide conservation at approximately the mid-way point between that of Alternatives 3 and 5. Washington Forest Practice Regulations (WFPR) would be applied where NWFP guidelines are not defined. An HCP would be implemented for the same fish and wildlife species covered by Alternative 3, and an ITP would be issued for those species.
5	Northwest Forest Plan	Management would follow the standards and guidelines identified for the Northwest Forest Plan (NWFP). Washington Forest Practice Rules would be applied where NWFP guidelines are not defined. An HCP would be implemented for the same fish and wildlife species covered by Alternative 3, and an ITP would be issued for those species.

13.2 ALTERNATIVES ANALYZED

Alternatives 1, 3, and 4 were analyzed in detail in the Draft Environmental Impact Statement ("DEIS"). Alternative 1, the "No Action Alternative," involves the continued use of Simpson's current forest management program. This alternative is the baseline against which the effects of all other alternatives were measured, and that analysis is provided in the DEIS associated with this HCP. Alternatives 2 and 5 were not analyzed in detail or considered further because of the reasons listed below.

Alternative 2: Alternative 2 would result in implementing the current Forest Practices Rules on the 261,575 acre Action Area along with additional measures for riparian area conservation, unstable slope protection, road construction and road maintenance. These additional measures are referred to as the "Forestry Module", and this alternative includes provisions of the January 1999 version of that module.

The Forestry Module was drafted by a Washington State Timber Fish and Wildlife (TFW) committee with the primary goal of addressing existing, pending, and expected federal ESA listings of salmonid species in Washington. The Forestry Module is a result of approximately 18 months of negotiations between the timber industry, state agencies, most Washington State Tribes, and some federal agencies (USFWS, NMFS, EPA). The environmental caucus (Washington Environmental Council and Audubon Society) and some of the Tribes elected to end their participation late in the process. The Forestry Module represents the most reasonable timber management approach to salmonid conservation that the TFW participants could accept at the time of the January, 1999 revision.

Alternative 2 was not considered a viable management option for Simpson's management needs, as defined in Section 1.2. Specifically, Alternative 2 would not provide Simpson with the ITP coverage needed for listed, or potential future listed, wildlife species.

Alternative 5: Alternative 5 management would follow standards and guidelines within the Northwest Forest Plan (NWFP) which was developed for U.S. Forest Service and Bureau of Land Management Lands in Washington and Oregon. Washington Forest Practice Rules would be applied where NWFP guidelines are not defined. An HCP would be implemented for the same fish and wildlife species covered by Alternative 3, and an ITP would be issued for those species.

Alternative 5 is not an economically viable option for Simpson to implement. Conservation area set-asides required under Alternative 5 would be approximately 3.7 times greater than that required under Alternative 1. This and other requirements of Alternative 5 would reduce annual harvestable acreage to approximately 68 percent of that provided by Alternative 1. Implementing Alternative 5 also would lead to only about 65 percent of the company payroll and community employment as that provided by Alternative 1 management.

The excessive costs resulting from Alternative 5 would not meet the second primary purpose for implementing the HCP, which is to assure the HCP requirements do not unreasonably restrict Simpson's ability to continue conducting profitable timber management (Section 1.3). Additionally, Simpson is the largest employer within Mason County and economic losses resulting from implementing Alternative 5 would also result in substantial economic losses to Mason County, which is one of the least affluent counties in Washington State.

14 CONTINUING INVOLVEMENT AND DISPUTE RESOLUTION

14.1 SCIENCE ADVISORY TEAM

A Science Advisory Team ("SAT") will provide outside peer review of the resource assessment, monitoring, and research and the adaptive management aspects of this HCP. The SAT shall provide peer review and recommendations on study design, methods and analysis and associated adaptive management. Meetings of the SAT will be convened at the request of Simpson and minutes of any meetings shall be transcribed and made a part of the continuing HCP record. This group will be solely advisory and the responsibility for making decisions in respect of this HCP will remain with the Services and Simpson.

The SAT shall be composed of one person (jointly invited and approved by Simpson and the Services) from each of the following agencies and tribes: the NMFS, USFWS, EPA, the Squaxin and Skokomish Indian Tribes, the Quinault Indian Nation, the Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, and a wildlife and fisheries scientist representing Simpson. On an ad hoc basis, other scientists from academia or private industry with special expertise may be invited by Simpson to participate in a SAT meeting (e.g. a geologist or hydrologist).

14.2 DISPUTE RESOLUTION

If any dispute or disagreement should arise with respect to this plan or the meaning of its terms, Simpson and the Services agree to attempt to resolve the disagreement informally and in an expeditious manner. If consultations between the parties should fail to resolve the disagreement, Simpson and the Services will consider non-binding mediation or other alternative dispute resolution processes. As provided in the IA, however, Simpson and the Services reserve the right, at any time without completing informal dispute resolution procedures, to use whatever enforcement powers and remedies are available by law or regulation, including but not limited to, in the case of the Services, suspension or revocation of the ITP.

15 GLOSSARY

Abbreviations and acronyms

AGL	Alpine Glacial lithotopo unit
BMP	Best Management Practices
CIS	Crescent Islands lithotopo unit
CUP	Crescent Uplands lithotopo unit
DOE	Department of Ecology
DBH	Diameter breast height
DNR	Department of Natural Resources (Washington State)
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily significant unit
FC	Federal Candidate (species)
FE	Federal Endangered (species)
FSC	Federal Species of Concern
GIS	Geographic information system
HCP	Habitat Conservation Plan
HPA	Hydraulic Project Approval (permit)
IA	Implementation Agreement
ITP	Incidental Take Permit
LFR	Late-seral forest reserve
LLP	Landowner Landscape Plan
LTU	Lithotopo unit
LWD	Large Woody Debris
NMFS	National Marine Fisheries Service
NWI	National Wetlands Inventory
RCR	Riparian Conservation Reserve
ROP	Recessional Outwash Plain lithotopo unit
ROS	Rain on snow
SAT	Science Advisory Team
SC	State Candidate (species)
SE	State Endangered (species)
SG	State Game (species)
SIG	Sedimentary Inner Gorge lithotopo unit
SM	State Monitor (species)
SS	State Sensitive (species)
ST	State Threatened (species)
USFS	United States Forest Service
USFWS	United States fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

Definitions

Anadromous fish: Fish whose life history involves adult breeding in freshwater followed by variable residence in freshwater by the juveniles and migration to the marine environment and maturation prior to their return to freshwater to breed.

Aquatic dependent species: An animal species that requires some form of habitat that is supplied by water to complete its life history.

Basal area: The summed cross sectional area of tree boles in a stand expressed per unit area (e.g. square feet per acre).

Best Management Practice (BMP): Term used for management practices or prescriptions designed to protect the environment.

Break in slope (BIS): In Simpson's HCP; an identifiable position on valley walls of streams that is characterized by a slope deflection which essentially separates the valley wall from more general upland terrain. This break is often greater than 40% and is typically characterized by subtle changes in understory vegetation toward a drier community in the upslope direction. The toe of such valley slopes abut the CMZ or CDZ as described below.

Bog: A wetland type characterized by relatively deep organic soils and specialized plant species.

Channel: A watercourse defined by the presence of observable bed and banks.

Channel disturbance zone (CDZ): In Simpson's HCP; the zone adjacent to small streams that has a close linkage to several riparian forest functions. In most cases it essentially constitutes the valley floor. In many of the small stream classes, this zone may be occupied or traversed by the stream when it is dammed by beaver, diverted by a large log or a small side slope failure, or it may be the runout zone for debris flows. In most cases this zone may be identified based on vegetation (i.e. the line between the wet and more xeric plant communities). However, CDZ also typically has inclusions of slightly higher ground that support the more xeric plant communities.

Channel migration zone (CMZ): In Simpson's HCP; the floodplain and lower terraces of streams and rivers that may be occupied by the channel at some future time. This extends to the 100 year flood plain and in cases of highly erodible soils may extend beyond to include low terraces.

Cowardin vegetation class: A type of wetland plant community used for classifying wetlands in a system developed by Lewis M. Cowardin and others. The Cowardin system of classifying wetlands has been widely used in the United States since 1979 for a variety of purposes.

Delivery: Transfer of sediment from hillslope to stream channels. Sediment deposited in active stream channels is said to be delivered; sediment deposited on a floodplain, for example, is considered non-delivering.

Diameter breast height (DBH): The diameter of a tree about 4.5 feet above the ground on the uphill side.

Equipment exclusion zone: Zone adjacent to a stream or wetland where the operation of any wheeled or tracked equipment is prohibited.

Fish bearing: Used to refer to streams that support fish of any kind.

Fluvial process: Processes controlled and initiated by flowing water; e.g. sediment transport in rivers.

Habitat Conservation Plan (HCP): This plan.

Hollow: The concave area above the point of channel initiation in a valley where colluvial material (soil and unconsolidated rock) accumulates and infrequently evacuates forming landslides and debris flows (on the order of thousands of years under natural conditions).

HGM approach: Of or relating to the surface or sub-surface flow characteristics and physical landform and which are commonly controlled by surficial geology and geological history.

Implementation Agreement (IA): A contractual agreement between Simpson and the Services that controls the implementation of the HCP.

Incidental take: Take that has occurred incidental to an otherwise lawful activity".

Incidental take permit (ITP): Permit issued to Simpson pursuant to the ESA that allows for take of a covered species.

Intermittent stream: A stream whose surface flow does not persist continually throughout the entire calendar year.

Large Woody Debris (LWD): Woody debris that is the structural component of stream habitat; typically 10 cm diameter and 2 meters in length, minimum size.

Late-seral forest reserve (LFR): In Simpson's HCP; a tract of land within the riparian conservation reserve that is a relatively large contiguous area and either has older age forest characteristics or will have in the future.

Legacy roads: Forest roads constructed prior to 1974 and not currently used for forest management activities; also referred to as "orphaned" roads.

Lithotopo unit (LTU): In a scheme of regional geologic stratification, a local landscape associated with similar bedrock lithology and topography. These similarities control physical processes that strongly influence habitat characteristics at finer scales.

Perennial stream: A stream whose surface flow persists throughout the calendar year.

Resident fish: Species of fish that live their entire lives in freshwater, usually in a single water body and in many cases, in reaches that are isolated above waterfalls that exclude anadromous fish.

Riparian conservation reserve (RCR): In Simpson's HCP; lands associated with streams or wetlands that have been set aside for management other than clear cut harvesting.

Seral: Of or relating to plant community age or successional character.

Take: To "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct".

Unstable slope: A hill slope having such physical characteristics that may cause it to "fail" structurally and initiate a landslide.

Windthrow: Trees felled or blown over by wind; differs from "wind snap" in that the root wad is upended in windthrown trees as opposed to the breakage of the tree bole. Also commonly referred to as "blowdown".

Wind snap: Trees broken by wind; frequently the crown of the tree is snapped off leaving only a few live branches.

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